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Factory Workshop Manual

Make

Chevrolet

Model

G 20 Van

Engine and year

V8-350 5.7L (1985)

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This manual was submitted by

Anonymous

Date

1st January 2018

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Relays and Modules > Relays and Modules - Accessories and Optional Equipment > Relay Module > Component Information > Technical Service Bulletins > Customer Interest for Relay Module: > 09-06-03-004D > Dec > 10 > Electrical - MIL ON/DTC's Set By Various Control Modules

Relay Module: Customer Interest Electrical - MIL ON/DTC's Set By Various Control Modules

TECHNICAL

Bulletin No.: 09-06-03-004D

Date: December 08, 2010

Subject: Intermittent No Crank/No Start, No Module Communication, MIL, Warning Lights, Vehicle Messages or DTCs Set by Various Control Modules - Diagnosing and Repairing Fretting Corrosion (Disconnect Affected Connector and Apply Dielectric Lubricant)

Models:

2011 and Prior GM Passenger Cars and Trucks

Attention:

This repair can be applied to ANY electrical connection including, but not limited to: lighting, body electrical, in-line connections, powertrain control sensors, etc. DO NOT over apply lubricant to the point where it prevents the full engagement of sealed connectors. A light coating on the terminal surfaces is sufficient to correct the condition.

Supercede: This bulletin is being revised to update the Attention statement and add the 2011 model year. Please discard Corporate Bulletin Number 09-06-03-004C (Section 06 - Engine/Propulsion System).

Condition

Some customers may comment on any of the following conditions:

- An intermittent no crank/no start

- Intermittent malfunction indicator lamp (MIL) illumination

- Intermittent service lamp illumination

- Intermittent service message(s) being displayed

The technician may determine that he is unable to duplicate the intermittent condition.

Cause

This condition may be caused by a buildup of nonconductive insulating oxidized debris known as fretting corrosion, occurring between two electrical contact surfaces of the connection or connector. This may be caused by any of the following conditions:

- Vibration

- Thermal cycling

- Poor connection/terminal retention

- Micro motion

- A connector, component or wiring harness not properly secured resulting in movement

On low current signal circuits this condition may cause high resistance, resulting in intermittent connections.

On high current power circuits this condition may cause permanent increases in the resistance and may cause a device to become inoperative.

Representative List of Control Modules and Components

The following is only a representative list of control modules and components that may be affected by this connection or connector condition and DOES NOT include every possible module or component for every vehicle.

- Blower Control Module

- Body Control Module (BCM)

- Communication Interface Module (CIM)

- Cooling Fan Control Module

- Electronic Brake Control Module (EBCM)

- Electronic Brake and Traction Control Module (EBTCM)

- Electronic Suspension Control (ESC) Module

- Engine Control Module (ECM)

- Heating, Ventilation and Air Conditioning (HVAC) Control Module

- HVAC Actuator

- Inflatable Restraint Sensing and Diagnostic Module (SDM)

- Any AIR BAG module

- Seatbelt Lap Anchor Pretensioner

- Seatbelt Retractor Pretensioner

- An SIR system connection or connector condition resulting in the following DTCs being set: B0015, B0016, B0019, B0020, B0022, or B0023

- Powertrain Control Module (PCM)

- Remote Control Door Lock Receiver (RCDLR)

- Transmission Control Module (TCM)

Correction

Important DO NOT replace the control module, wiring or component for the following conditions:

- The condition is intermittent and cannot be duplicated.

- The condition is present and by disconnecting and reconnecting the connector the condition can no longer be duplicated.

Use the following procedure to correct the conditions listed above.

1. Install a scan tool and perform the Diagnostic System Check - Vehicle. Retrieve and record any existing history or current DTCs from all of the

control modules (refer to SI).

‹› If any DTC(s) are set, refer to Diagnostic Trouble Code (DTC) List - Vehicle to identify the connector(s) of the control module/component

which may be causing the condition (refer to SI).

‹› If DTCs are not set, refer to Symptoms - Vehicle to identify the connector(s) of the control module/component which may be causing the

condition (refer to SI).

2. When identified, use the appropriate DTC Diagnostics, Symptoms, Schematics, Component Connector End Views and Component Locator

documents to locate and disconnect the affected harness connector(s) which are causing the condition.

Note Fretting corrosion looks like little dark smudges on electrical terminals and appear where the actual electrical contact is being made. In less severe cases it may be unable to be seen or identified without the use of a magnifying glass.

Important DO NOT apply an excessive amount of dielectric lubricant to the connectors as shown, as hydrolock may result when attempting to mate the connectors. Use ONLY a clean nylon brush that is dedicated to the repair of the conditions in this bulletin.

3. With a one-inch nylon bristle brush, apply dielectric lubricant to both the module/component side and the harness side of the affected connector(s).

4. Reconnect the affected connector(s) and wipe away any excess lubricant that may be present.
5. Attempt to duplicate the condition by using the following information:

- DTC Diagnostic Procedure

- Circuit/System Description

- Conditions for Running the DTC

- Conditions for Setting the DTC

- Diagnostic Aids

- Circuit/System Verification

‹› If the condition cannot be duplicated, the repair is complete. ‹› If the condition can be duplicated, then follow the appropriate DTC, Symptom or Circuit/System Testing procedure (refer to SI).

Repair Order Documentation

Part Number	Description	Material Allowance
12377900 (U.S.) 10953529 (Canada)	Dielectric Lubricant (50 gram tube)	$11.56 (USD) ($2.90 per repair) $17.35 (CDN) ($4.35 per repair)

Labor Operation	Description	Labor Time
N9613*	Lubricate Body Control Module (BCM) Connector With Dielectric Lubricant	0.1-0.3 hr
J7729*	Lubricate Engine Control Module (ECM) Connector With Dielectric Lubricant	0.1-0.3 hr
K9534*	Lubricate Transmission Control Module (TCM) Connector With Dielectric Lubricant	0.1-0.3 hr
J7730*	Lubricate Powertrain Control Module (PCM) Connector With Dielectric Lubricant	0.1 0.3 hr
H9740*	Lubricate Electronic Brake Control Module (EBCM) Connector With Dielectric Lubricant	0.1-0.3 hr
D9752*	Lubricate Heating, Ventilation and Air Conditioning (HVAC) Control Module Connector With Dielectric Lubricant	0.1 0.3 hr
C9897*	Lubricate Inflatable Restraint Sensing and Diagnostic Module (SDM) Connector With Dielectric Lubricant	0.1-0.3 hr
R9763*	Lubricate Radio Connector With Dielectric Lubricant	0.1-0.3 hr
N9614*	Lubricate Underhood Bussed Electrical Center (UBEC) Connector With Dielectric Lubricant	0.1-0.3 hr
N9615*	Lubricate Integrated Bussed Electrical Center (IBEC) Connector With Dielectric Lubricant	0.1-0.3 hr
N9612*	Lubricate **"Other"** Connector With Dielectric Lubricant**	0.1-0.3 hr

*This labor operation number is for bulletin use only. It will not be published in the Labor Time Guide.

****You Must** Document the Affected Connector on the Repair Order.

Note
Any additional time for component R&R to gain access or for repair time greater than 0.3 hr must be submitted as Other Labor Hours and requires appropriate authorization and service management approval.

Important The following information MUST be documented on the repair order. Failure to do so may result in a chargeback.

- Customer vehicle condition.

- Was a Service Lamp or Service Message illuminated? If yes, specify which Service Lamp or Service Message.

- Was a DTC(s) set? If yes, specify which DTC(s) were set.

- After following the procedure contained within this bulletin, could the condition be duplicated?

‹› If the condition was not duplicated, then document the affected module/component connector name and number on the repair order.

- If the condition was duplicated after the procedure contained within this bulletin was followed, and additional diagnosis led to the replacement of a module or component, the SI Document ID Number MUST be written on the repair order.

Parts Information

Alternate Distributor For All of North America

Note

NyoGel(R) 760G Lubricant* is equivalent to GMSPO P/N 12377900, and P/N 10953529 (Canada), specified for use to correct the condition in this bulletin.

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Warranty Information (excluding Saab Models)

For vehicles repaired under warranty, use the appropriate/closest labor operation depending upon the module/component connection that the dielectric lubricant was applied to:

Warranty Information (Saab Models)

Labor Operation	Description	Failed Object	Fault/Reason Code	Location Code	Warranty Type	Repair/Action Code	Labor Time
3710101*	Lubricate Body Control Module (BCM) Connector With Dielectric Lubricant	37101	11	0	01/06	08	0.3
3710102*	Lubricate Engine Control Module (ECM) & Powertrain Control Module (PCM) Connector With Dielectric Lubricant	37101	11	0	01/06	08	0.3
3710103*	Lubricate Radio Connector With Dielectric Lubricant	37101	11	0	01/06	08	0.3
3710104*	Lubricate Transmission Control Module (TCM) Connector With Dielectric Lubricant	37101	11	0	01/06	08	0.3
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Disclaimer

Relay Module: All Technical Service Bulletins Electrical - MIL ON/DTC's Set By Various Control Modules

TECHNICAL

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Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Relays and Modules > Relays and Modules - Cruise Control > Cruise Controller <--> [Cruise Control Module] > Component Information > Technical Service Bulletins > Customer Interest for Cruise Controller: > 8594 > Jun > 85 > Cruise Control - Engine Surge More Noticeable Low Speeds

Cruise Controller: Customer Interest Cruise Control - Engine Surge More Noticeable Low Speeds

85-94 9 JUNE, 1985 Subject:

CRUISE CONTROL SURGE

Model and Year: 1985 MONTE CARLO WITH 4.3L V6 (ENGINE CODE Z) AND CRUISE CONTROL (K34)

TO: ALL CHEVROLET DEALERS

Some 1985 Monte Carlos with 4.3L engines may exhibit an engine surge condition when the cruise control is operating. This condition is more noticeable at low speeds.

Many items can cause a cruise control surge condition, so a general cruise system inspection should be made first. Some things to look for are:

1. Proper cruise control cable routing (no kinks or sharp bends.)

2. Proper cruise control cable adjustment.

3. Vacuum hoses to accumulator or servo leaking or restricted.

4. Binding speedometer cable.

Refer to the 1985 Shop Manual for specifications on Items #1 and #2.

A new cruise control module (P/N 25031946) is available to repair the surge condition. Early production vehicles used P/N 25031953.

A road test should be performed to verify that the surge condition has been repaired.

Use applicable labor operation.

Cruise Controller: All Technical Service Bulletins Cruise Control - Engine Surge More Noticeable Low Speeds

85-94 9 JUNE, 1985 Subject:

CRUISE CONTROL SURGE

Model and Year: 1985 MONTE CARLO WITH 4.3L V6 (ENGINE CODE Z) AND CRUISE CONTROL (K34)

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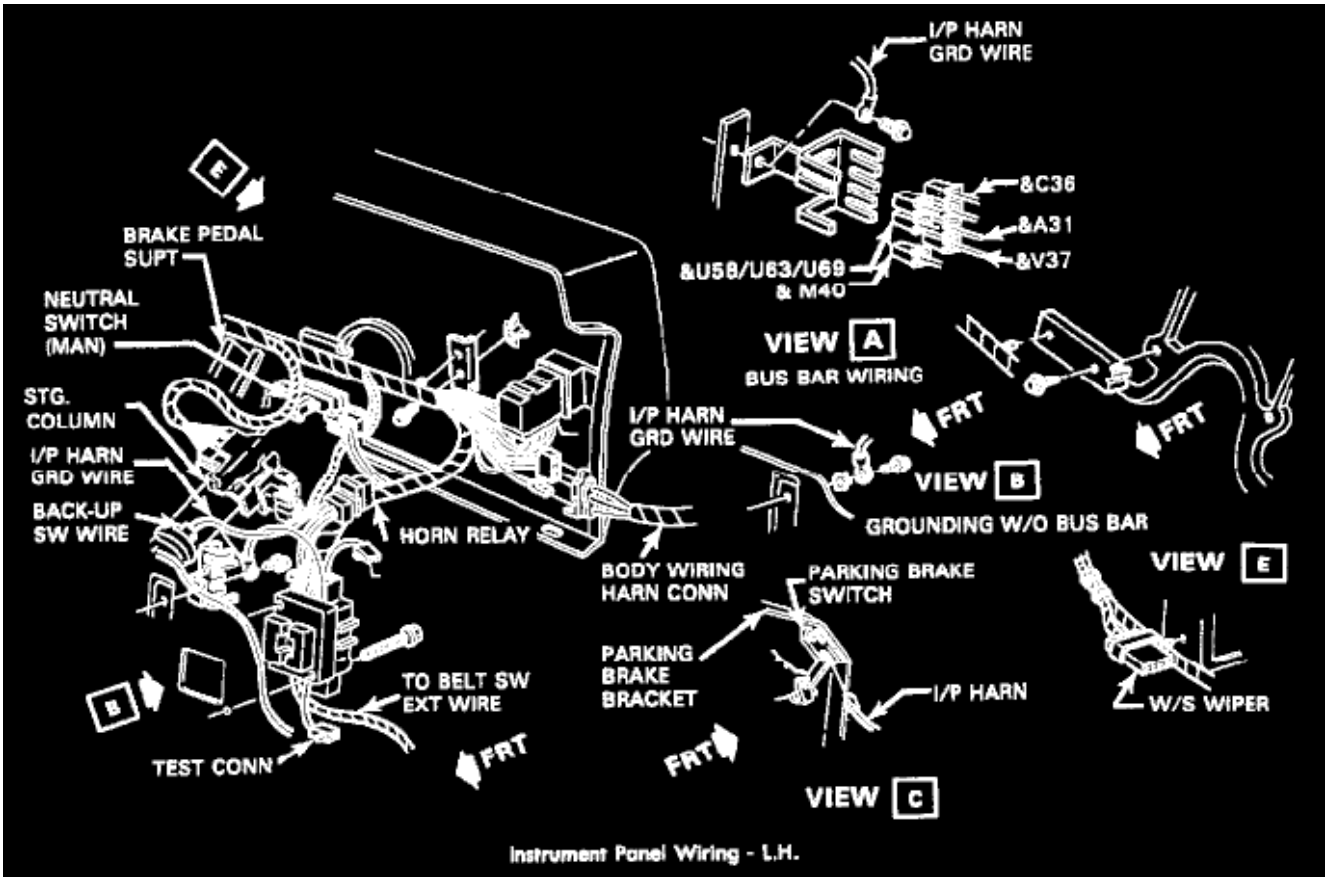
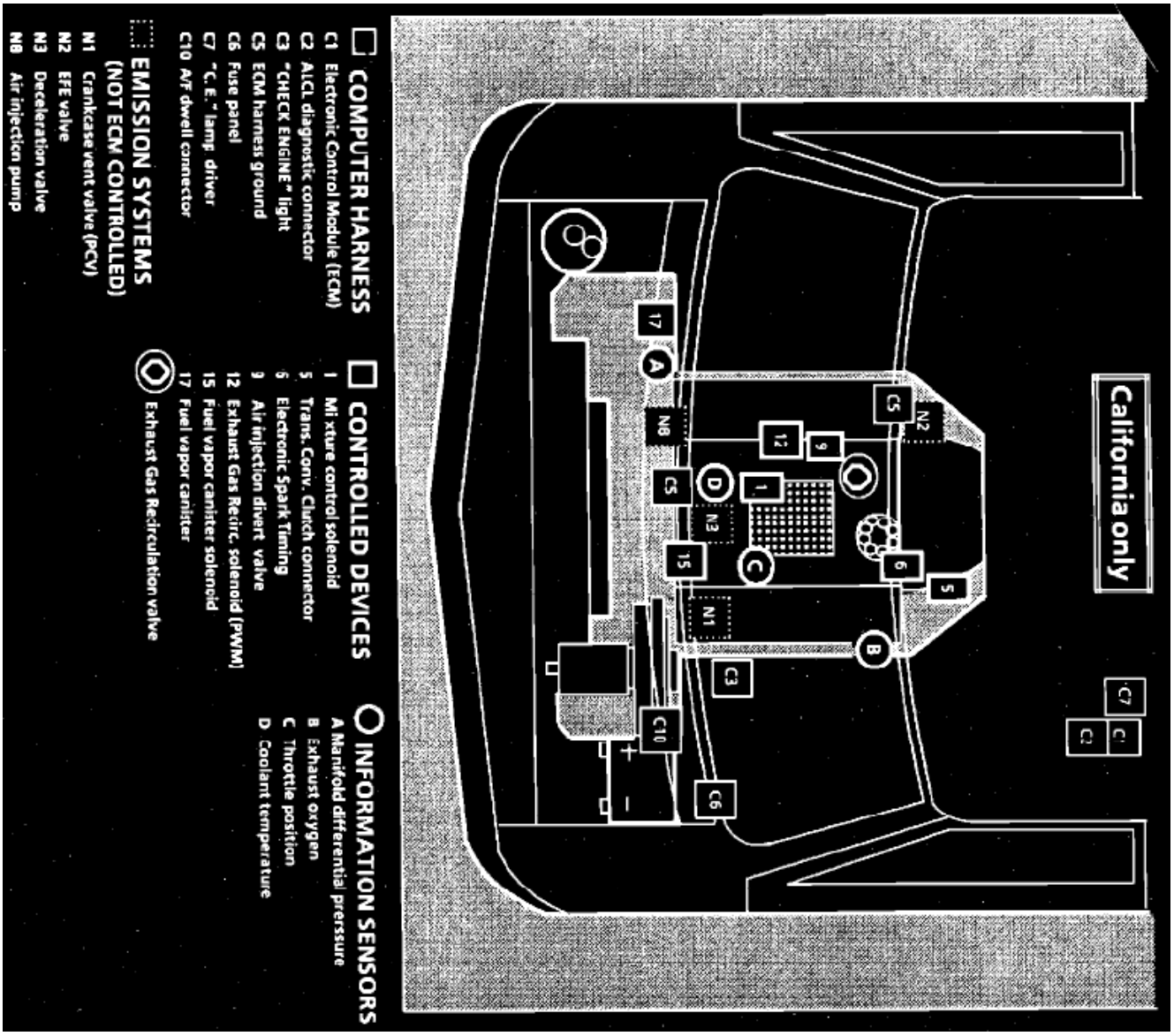
Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Relays and Modules > Relays and Modules - Lighting and Horns > Horn Relay > Component Information > Locations





Lamp Control Module: Locations

Underhood & Engine Components.

Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L California

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Relays and Modules > Relays and Modules - Powertrain Management > Relays and Modules - Computers and Control Systems > Electronic Spark Timing <--> [Electronic Spark Control Module] > Component Information > Locations > Typical Electronic Spark System (ESC)

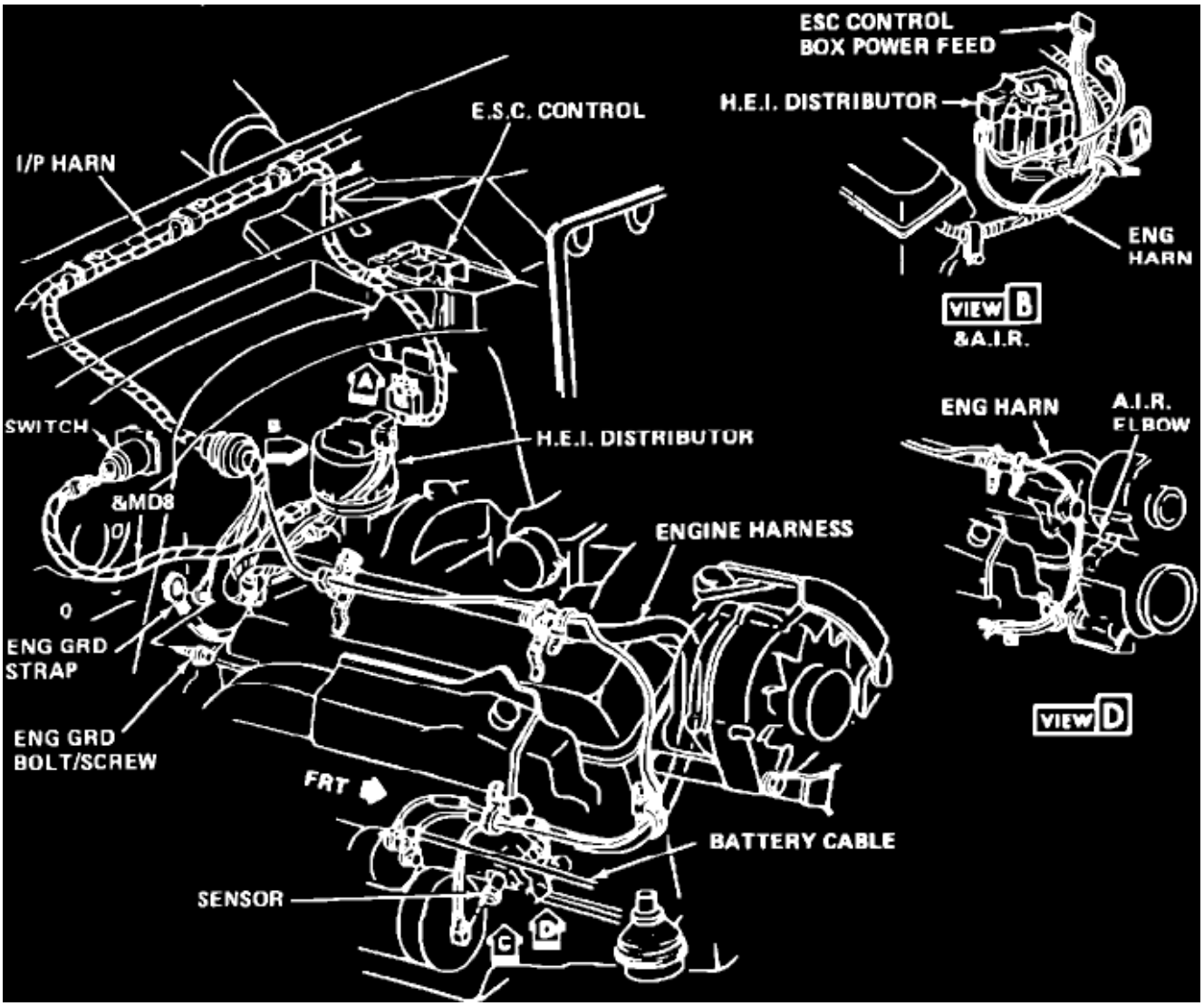


Fig. 46 Typical Electronic Spark System (ESC)

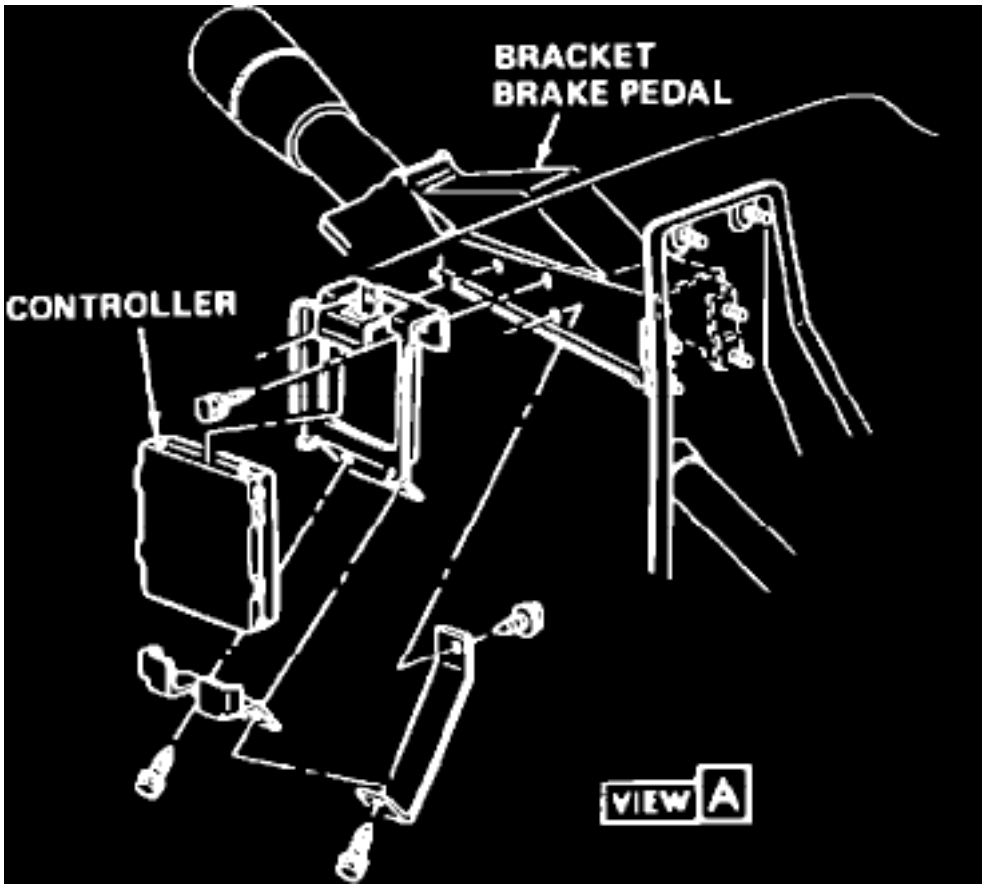
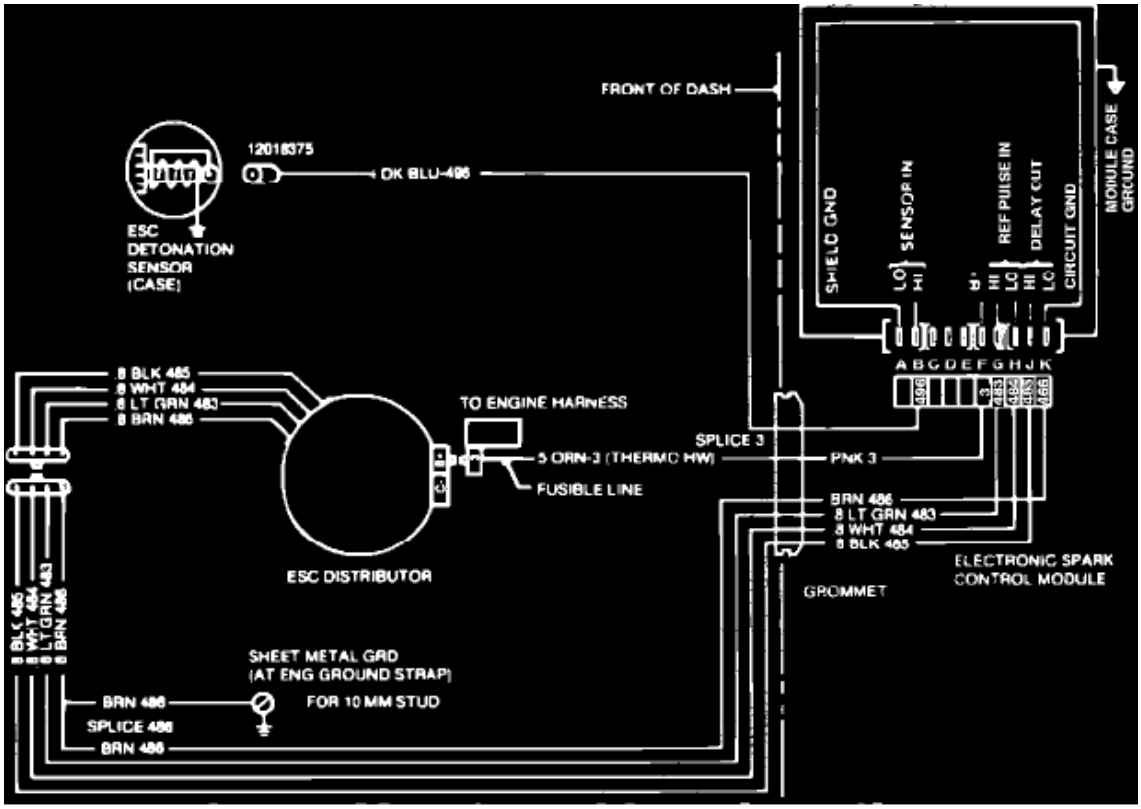
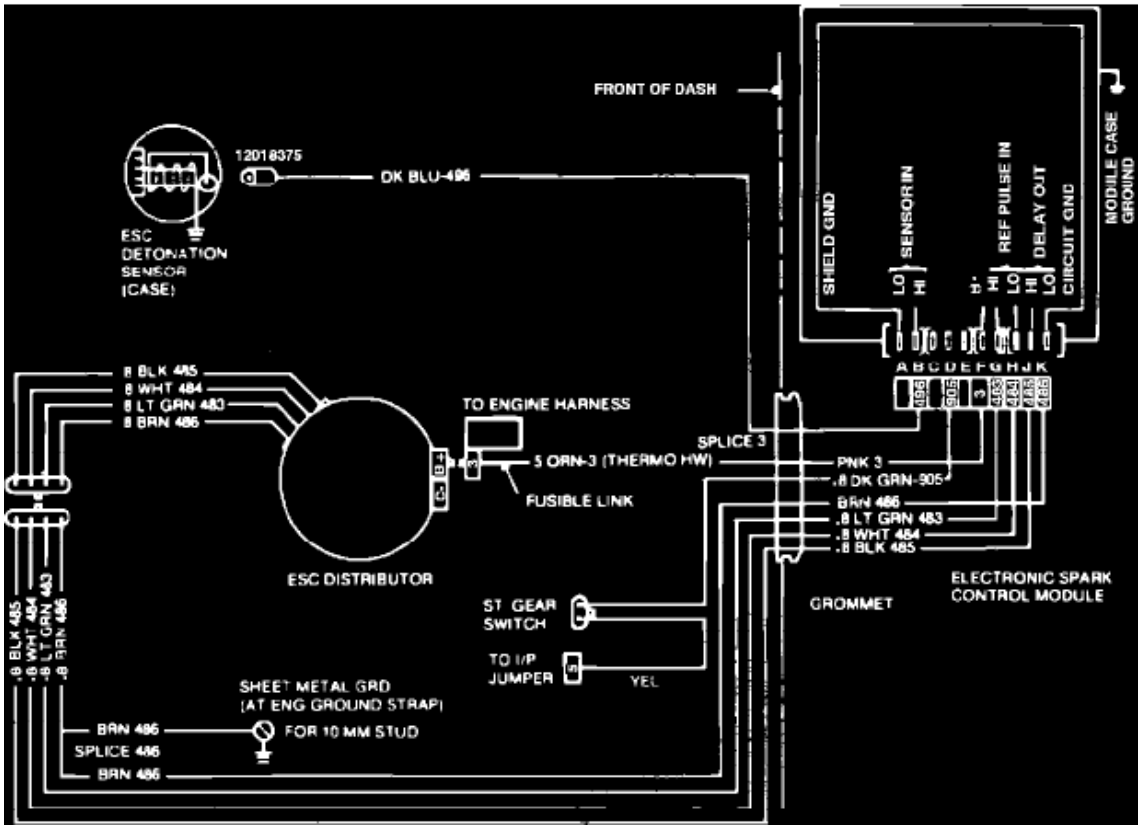


Fig. 47 Typical ESC Controller





Electronic Spark Timing: Testing and Inspection

Use the following procedures to diagnose ESC system malfunctions only. To diagnose general ignition system malfunctions, refer to ``High Energy Ignition (HEI) System Diagnosis.''

Fig. 5 ESC system wiring schematic. 1984-86 models w/manual 4 speed top loader transmission

Fig. 6 ESC system wiring schematic. 1984-86 models w/manual 3 & 4 speed side loader transmission

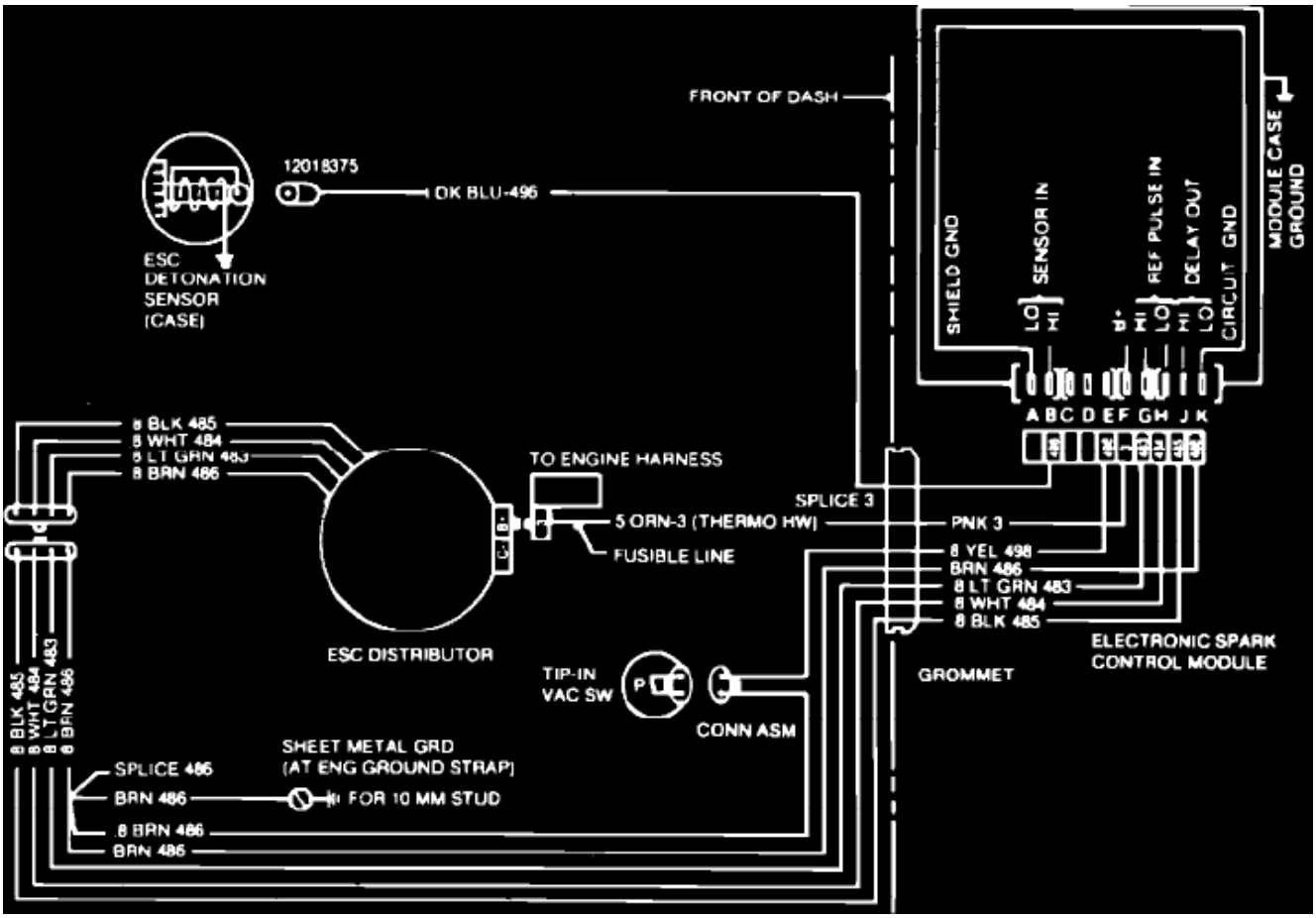


Fig. 7 ESC system wiring schematic. 1984-86 models w/auto. trans.

1984-86 MODELS

Engine Cranks But Will Not Start

1. Check for spark at at the ends of at least 2 spark plug wires using tester ST-125 or equivalent. If spark is observed, malfunction is not in ignition system.

2. If no spark is observed, disconnect 4 pin connector to distributor, connect jumper wire between pins A and C on distributor side of connector, Figs. 5, 6 and 7, and attempt to start engine. If engine starts, proceed to step 3. If engine does not start, proceed as follows:

a. Remove jumper wire and reconnect 4 pin connector to distributor. Turn on ignition and measure voltage at pins F and K of controller 10 pin

connector. If voltage is less than 11.6 volts, check feed circuit and repair as needed.

b. Set voltmeter on 2 volt scale and measure voltage between pins J and K of 10 pin connector while cranking engine. If reading is .75 volts or

greater, ESC system is satisfactory.

c. Set voltmeter on 2 volt scale and measure voltage between pins G and H of 10 pin connector while cranking engine. If reading is .20 volt or

greater, controller is defective. If reading is less than .20 volt, pole piece is defective.

3. Stop engine and remove jumper wire from distributor.

4. Connect suitable high resistance test lamp between distributor TACH terminal and ground, then turn on ignition. If test lamp lights, proceed to step 6.

5. If lamp does not light at TACH terminal, connect lamp between BAT terminal and ground and turn on ignition. If lamp does not light, repair feed circuit to ignition.

6. Crank engine with test lamp connected between distributor TACH terminal and ground. If test lamp flickers, system is satisfactory.

7. If test lamp does not flicker as engine is cranked, connect lamp between BAT terminal and pin A on distributor side of 4 pin ESC connector, then tap on coil. If coil makes a clicking noise when tapped, pole piece is defective.

8. If coil does not click, remove distributor cap an disconnect and reconnect pole piece electrical connector. If coil still does not click when tapped, ignition module is defective.

Poor Engine Performance

1. Disconnect distributor 4 pin connector, connect pins A and C on distributor side of connector with jumper wire, and road test vehicle.

2. If engine performance is still poor, cause is not in ESC system. If proper engine performance is restored by disconnecting ESC controller from distributor, remove jumper wire, reconnect 4 pin connector and proceed to next step.

3. Disconnect 10 pin connector from ESC controller, inspect terminals for proper contact, shots and opens, repair as needed, then recheck system operation.

4. If problem persists, disconnect 10 pin connector and measure resistance between pins B and K in connector. Reading should be 98-99 Kohms.

5. If resistance is not as specified, disconnect electrical connector from knock sensor and measure resistance between sensor terminal and ground. If resistance is 98-99 ohms, repair wiring between

knock sensor and controller. If resistance is not 98-99 Kohms, knock sensor is defective.

6. Reconnect 10 pin connector to controller and measure voltage between pins F and K with ignition on. If voltage reading is less than 11.6 volts repair feed circuit as needed.

7. Set voltmeter on 20 volt AC scale and measure voltage between connector pins H and K with ignition on. If reading is less than .20 volt, inspect system wiring and repair as needed. If reading is greater than .20 volt, ensure all connectors are properly seated, then road test vehicle. If problem persists, replace ESC controller.

Engine Detonation

1. Inspect connector and wiring to knock sensor and repair as needed.

2. Connect suitable spark advance tester to engine, run engine until it reaches normal operating temperature and set engine to run at a minimum of 1200 RPM, then observe ignition timing while tapping on exhaust manifold. If ignition timing retards when manifold is tapped, ESC system is operating properly.

3. Stop engine, disconnect 10 pin connector from ESC controller and measure resistance between pins B and K of connector. If resistance is not 98-99 ohms, proceed to step 5.

4. Measure resistance between pins H and K in connector. If resistance is 14-16 ohms, replace controller. If resistance is not 14-16 ohms, repair wiring to controller.

5. Disconnect electrical connector from knock sensor and measure voltage at sensor terminal with engine running at 2000 RPM. If reading is not .08 volt or more, knock sensor is defective.

6. Stop engine. If knock sensor voltage output is satisfactory, check wiring between knock sensor and terminal B of controller and between controller terminal K and ground and repair as needed.

Engine Control Module: Technical Service Bulletins Engine Controls - Aftermarket Accessory Usage

INFORMATION

Bulletin No.: 04-06-04-054B

Date: November 18, 2010

Subject: Info - Non-GM Parts and Accessories (Aftermarket)

Models:

2011 and Prior GM Passenger Cars and Trucks

Supercede: This bulletin is being revised to add model years and update to the new U.S. Fixed Operation Manager (FOM) and Canada Warranty Manager (WM) names. Please discard Corporate Bulletin Number 04-06-04-054A (Section 06 - Engine/Propulsion System).

The recent rise and expansion of companies selling non-GM parts and accessories has made it necessary to issue this reminder to dealers regarding GM's policy on the use and installation of these aftermarket components.

When a dealer is performing a repair under the New Vehicle Limited Warranty, they are required to use only genuine GM or GM-approved parts and accessories. This applies to all warranty repairs, special policy repairs or any repairs paid for by GM. Parts and accessories advertised as being "the same" as parts manufactured by GM, but not sold through GM, do not qualify for use in warranty repairs, special policy repairs or any repairs paid for by GM.

During a warranty repair, if a GM original equipment part is not available through GM Customer Care and Aftersales (GM CC&A;), ACDelco(R) distributors, other GM dealers or approved sources, the dealer is to obtain comparable, non-GM parts and clearly indicate, in detail, on the repair order the circumstances surrounding why non-GM parts were used. The dealer must give customers written notice, prior to the sale or service, that such parts or accessories are not marketed or warranted by General Motors.

It should also be noted that dealers modifying new vehicles and installing equipment, parts and accessories obtained from sources not authorized by GM are responsible for complying with the National Traffic and Motor Vehicle Safety Act. Certain non-approved parts or assemblies, installed by the dealer or its agent not authorized by GM, may result in a change to the vehicle's design characteristics and may affect the vehicle's ability to conform to federal law. Dealers must fully understand that non-GM approved parts may not have been validated, tested or certified for use. This puts the dealer at risk for potential liability in the event of a part or vehicle failure. If a GM part failure occurs as the result of the installation or use of a non-GM approved part, the warranty will not be honored.

A good example of non-authorized modification of vehicles is the result of an ever increasing supply of aftermarket devices available to the customer, which claim to increase the horsepower and torque of the Duramax(TM) Diesel Engines. These include the addition of, but are not limited to one or more of the following modifications:

- Propane injection

- Nitrous oxide injection

- Additional modules (black boxes) that connect to the vehicle wiring systems

- Revised engine calibrations downloaded for the engine control module

- Calibration modules which connect to the vehicle diagnostic connector

- Modification to the engine turbocharger waste gate

Although the installation of these devices, or modification of vehicle components, can increase engine horsepower and torque, they may also negatively affect the engine emissions, reliability and/or durability. In addition, other powertrain components, such as transmissions, universal joints, drive shafts, and front/rear axle components, can be stressed beyond design safety limits by the installation of these devices.

General Motors does not support or endorse the use of devices or modifications that, when installed, increase the engine horsepower and torque. It is because of these unknown stresses, and the potential to alter reliability, durability and emissions performance, that GM has adopted a policy that prevents any UNAUTHORIZED dealer warranty claim submissions to any remaining warranty coverage, to the powertrain and driveline components whenever the presence of a non-GM (aftermarket) calibration is confirmed - even if the non-GM control module calibration is subsequently removed. Refer to the latest version of Bulletin 09-06-04-026 (V8 Gas Engines) or 06-06-01-007 (Duramax(TM) Diesel Engines) for more information on dealer requirements for calibration verification.

These same policies apply as they relate to the use of non-GM accessories. Damage or failure from the use or installation of a non-GM accessory will not be covered under warranty. Failure resulting from the alteration or modification of the vehicle, including the cutting, welding or disconnecting of the vehicle's original equipment parts and components will void the warranty.

Additionally, dealers will NOT be reimbursed or compensated by GM in the event of any legal inquiry at either the local, state or federal level that

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

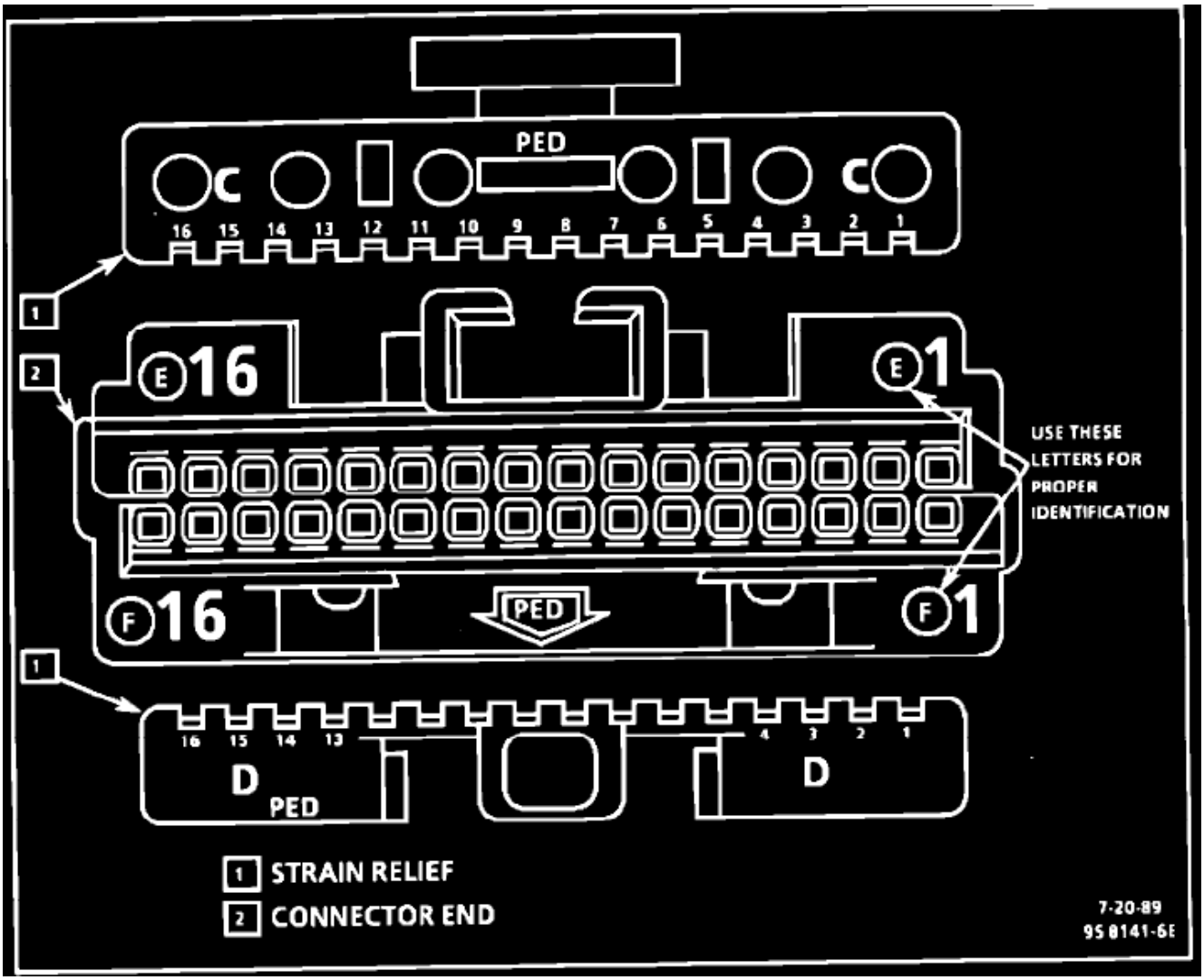
results from the alteration or modification of a vehicle using non-GM approved parts or accessories.

Dealers should be especially cautious of accessory companies that claim the installation of their product will not void the factory warranty. Many times these companies have even given direction on how to quickly disassemble the accessory in an attempt to preclude the manufacturer from finding out that is has been installed.

Any suspect repairs should be reviewed by the Fixed Operations Manager (FOM), and in Canada by the Warranty Manager (WM) for appropriate repair direction. If it is decided that a goodwill repair is to be made on the vehicle, even with the installation of such non-GM approved components, the customer is to be made aware of General Motors position on this issue and is to sign the appropriate goodwill documentation required by General Motors.

It is imperative for dealers to understand that by installing such devices, they are jeopardizing not only the warranty coverage, but also the performance and reliability of the customer's vehicle.

Disclaimer



Engine Control Module: Technical Service Bulletins ECM - Packard 32 Way Connector Identification

Number: 90-56-8

Section: 8

Date: September 1989

Corporate Bulletin No.: 916521R

Subject: PACKARD 32 WAY CONNECTOR IDENTIFICATION

Model and Year: 1980-90 A, B, F, G, J, L, W, Y CARS AND ALL TRUCKS WITH GMP4 ECM APPLICATIONS

TO: ALL CHEVROLET DEALERS

This bulletin serves to clarify the labeling of the Packard 32 way connectors used on the GMP4 under dash ECMS.

Currently a common strain relief is used in both the C-D 32 pin and the E-F 32 pin connectors. To properly identify these connectors, the strain reliefs must be removed. Use the lettering on the connector as shown on figure.

The colors used at this time for the 32 pin E-F connector are yellow, mint green or orange.

This updates any previous information released concerning identification that indicates any of these colors as being C & D connectors, found in the 6E and 8D Sections of the affected Service Manuals.

Engine Control Module: Technical Service Bulletins ECM/PCM - Damaged and/or Misdiagnosed

Number: 91-384-6E

Section: 6E

Date: AUGUST 1991

Corporate Bulletin No.: 176503

Subject: DAMAGED ECM/PCM AND/OR MIS-DIAGNOSED ECM/PCM SYMPTOMS DUE TO INCORRECT "TAP-TESTING" PROCEDURES

Model and Year: 1982-91 ALL PASSENGER CARS AND TRUCKS

CONDITION: Because of the intermittent nature of some Electronic Control Module (ECM) or Powertrain Control Modules (PCM) symptoms, some service technicians have been subjecting the ECM/PCM to vibration and/or shock testing. Commonly known as tap-testing, this procedure involves tapping on the ECM/PCM case, while the engine is running. It is generally accepted that if the engine or ECM/PCM falters due to the tapping, an intermittent internal ECM/PCM defect may be indicated. However, this may not always be true. If too much force is applied to the ECM/PCM during the test the following symptoms may result:

^ Immediate ECM/PCM failure.

^ ECM/PCM suffers damage which may cause a failure at a later date.

^ ECM/PCM Reset (or Glitch), creating a momentary stall, miss Service Engine Soon (SES) light and/or loss of serial data.

CAUSE: The ECM/PCM should be tapped using only the fingertips of one hand. Use of the palm, fist, or any type of tool subjects the ECM/PCM to forces that can cause both the circuit board and the outer aluminum case to flex and distort beyond design limits. The Integrated Circuits (IC) used in today's ECM/PCMs are mounted to the circuit board using a mounting process referred to as "surface technology." There are no circuit board holes for IC leads to go through. The IC leads set on pads, (28 pads or 52 pads depending on the IC) and solder is flowed around the leads to make the electrical connection to the circuit board.

^ Any flexing of the circuit board, beyond design limits, places the IC solder connections at risk of damage. Such damage may be apparent immediately, or it may appear at a future date. Circuit board deflection can occur as a result of striking the ECM/PCM, using ONLY THE PALM OF THE HAND.

^ If struck on the bottom side (the side opposite the service label), the ECM/PCM's aluminum outer case may deflect inward far enough to contact the electrical leads attached to the circuit board. Once in contact with the case the ECM/PCM electrical components will be shorted directly to ground. Although such shorting certainly has the potential to damage the ECM/PCM, it may not be permanent damage, depending on which circuit is involved. However, even if permanent damage is avoided, a short on any of the circuits will cause a disruption of normal ECM/PCM operation for the instant that the short occurs. This disruption may cause the ECM/PCM to reset (see "reset" above), creating the false impression that it is vibration sensitive or faulty. Reset is the ECM/PCM's normal way of coping with large voltage spikes. An ECM/PCM reset does not indicate that the ECM/PCM is defective or faulty, only that it is being subjected to abnormal conditions.

CORRECTION:

1. TAP THE ECM/PCM ONLY ON THE TOP SIDE (The top side is where the service label is located.)

^ This will minimize the chance of deflecting the ECM/PCM case into the electrical leads on the circuit board. The clearance between the case and the circuit board is closest on the bottom side of

the ECM/PCM.

2. TAP THE ECM/PCM USING ONLY THE FINGERTIPS - NO TOOLS.

^ To avoid excessive case deflection, avoid tapping in the center of the case. Tapping close to the edge of the ECM/PCM, especially in the corners, is best.

^ While using greater force may seem more effective, the test itself may cause the ECM/PCM to fail.

Engine Control Module: Technical Service Bulletins Engine Controls - ECM May Contain Wrong PROM

Number: 88-42

Section: 6E

Date: Sept., 1987

Subject: SERVICE REPLACEMENT ELECTRONIC MODULES (ECM) WITH PROM INSTALLED

Model and Year: 1981-88 ALL MODELS TO:

ALL CHEVROLET DEALERS

It has been brought to our attention that some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM for the vehicle.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

Engine Control Module: Technical Service Bulletins ECM - Revised Replacement Procedure

Number: 87-150

Section: 6E

Date: MAY, 1987

Subject: REVISED ECM REPLACEMENT PROCEDURE - CHART C-1

Model and Year: 1982 THROUGH 1987 ECM EQUIPPED VEHICLES

TO: ALL CHEVROLET DEALERS

The purpose of this bulletin is to introduce new ECM test procedures to reduce the possibility of multiple ECM failures on any one vehicle.

Since 1982, most ECM's have used an integrated circuit (IC) in place of separate transistors to turn "on" or "off" different components controlled by the ECM. These IC's are called quad drivers (QDR). Each QDR has four separate outputs, meaning it can turn "on" or "off" four different items independently.

A failed QDR usually results in an ECM output becoming either shorted to ground or open. Many times all four QDR output will be inoperative if just one vehicle circuit is faulty.

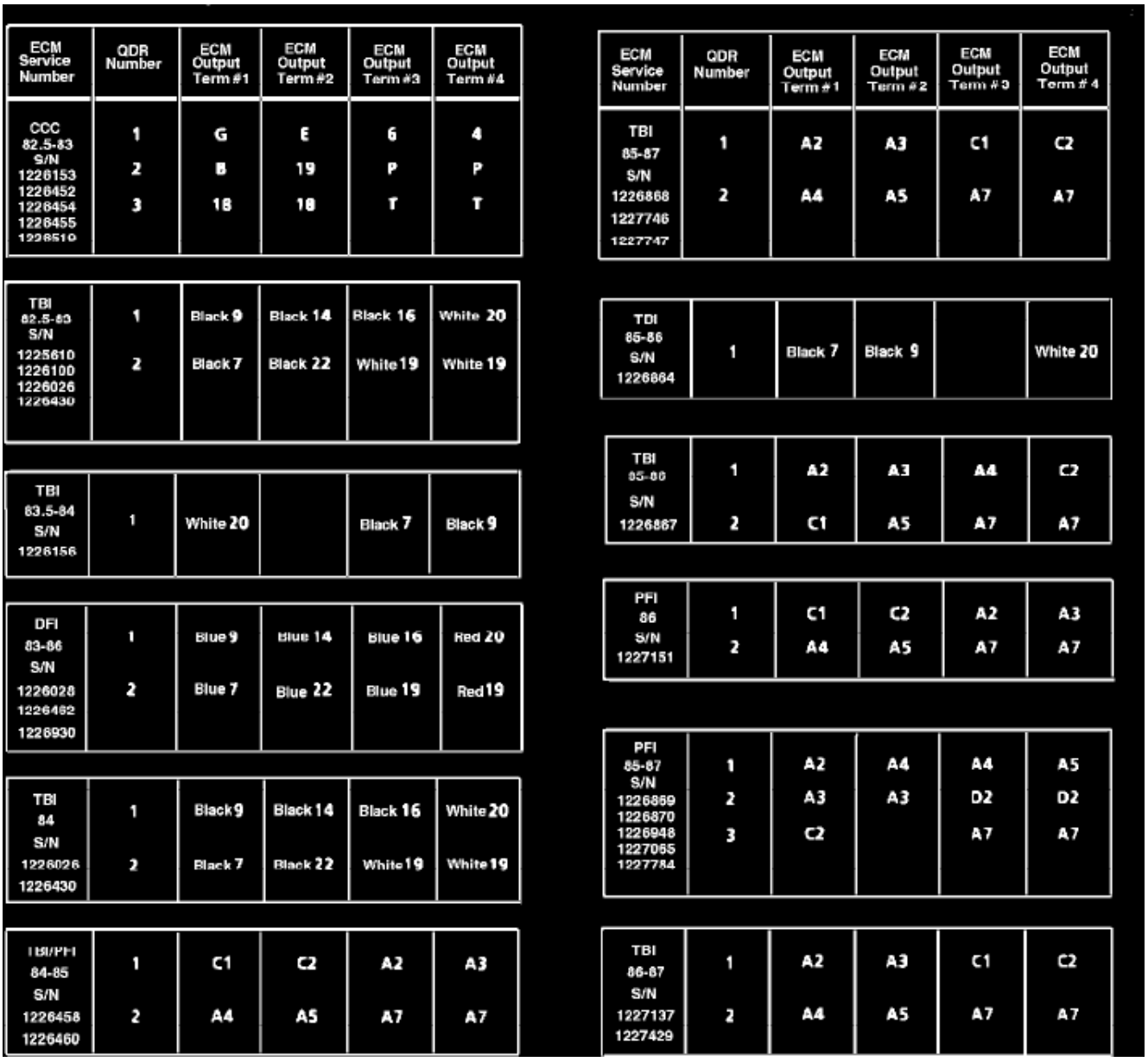
The revised diagnosis incorporates new test procedures designed to identify a damaged QDR. Once identified, the circuit must be repaired to reduce the incidence of repeat ECM failures.

This chart replaces the current service manual procedure for either:

1. Chart C-1 ECM replacement check, or

2. Any diagnostic chart where "replace ECM" is the conclusion, especially if a footnote indicates checking certain circuits for less than 20 OHM's resistance.

It is strongly suggested that this chart be used whenever an ECM replacement is indicated for 1982 through 1987 vehicles.



ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
CCC 82.5-83 S/N 1226153 1226452 1226454 1226455 1226510	1	G	E	6	4
	2	B	19	P	P
	3	18	18	T	T

ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
TBI 85-87 S/N 1226868 1227746 1227747	1	A2	A3	C1	C2
	2	A4	A5	A7	A7

TBI 82.5-83 S/N 1225610 1226100 1226026 1226430	1	Black 9	Black 14	Black 16	White 20
	2	Black 7	Black 22	White 19	White 19

TDI 85-86 S/N 1226864	1	Black 7	Black 9		White 20

TBI 83.5-84 S/N 1226156	1	White 20		Black 7	Black 9

TBI 85-86 S/N 1226867	1	A2	A3	A4	C2
	2	C1	A5	A7	A7

DFI 83-86 S/N 1226028 1226462 1226930	1	Blue 9	Blue 14	Blue 16	Red 20
	2	Blue 7	Blue 22	Blue 19	Red 19

PFI 86 S/N 1227151	1	C1	C2	A2	A3
	2	A4	A5	A7	A7

TBI 84 S/N 1226026 1226430	1	Black 9	Black 14	Black 16	White 20
	2	Black 7	Black 22	White 19	White 19

PFI 85-87 S/N 1226869 1226870 1226948 1227065 1227784	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	C2		A7	A7

TBI/PFI 84-85 S/N 1226458 1226460	1	C1	C2	A2	A3
	2	A4	A5	A7	A7

TBI 86-87 S/N 1227137 1227429	1	A2	A3	C1	C2
	2	A4	A5	A7	A7

QDR Application Chart

QDR Application Chart For CHART C-1

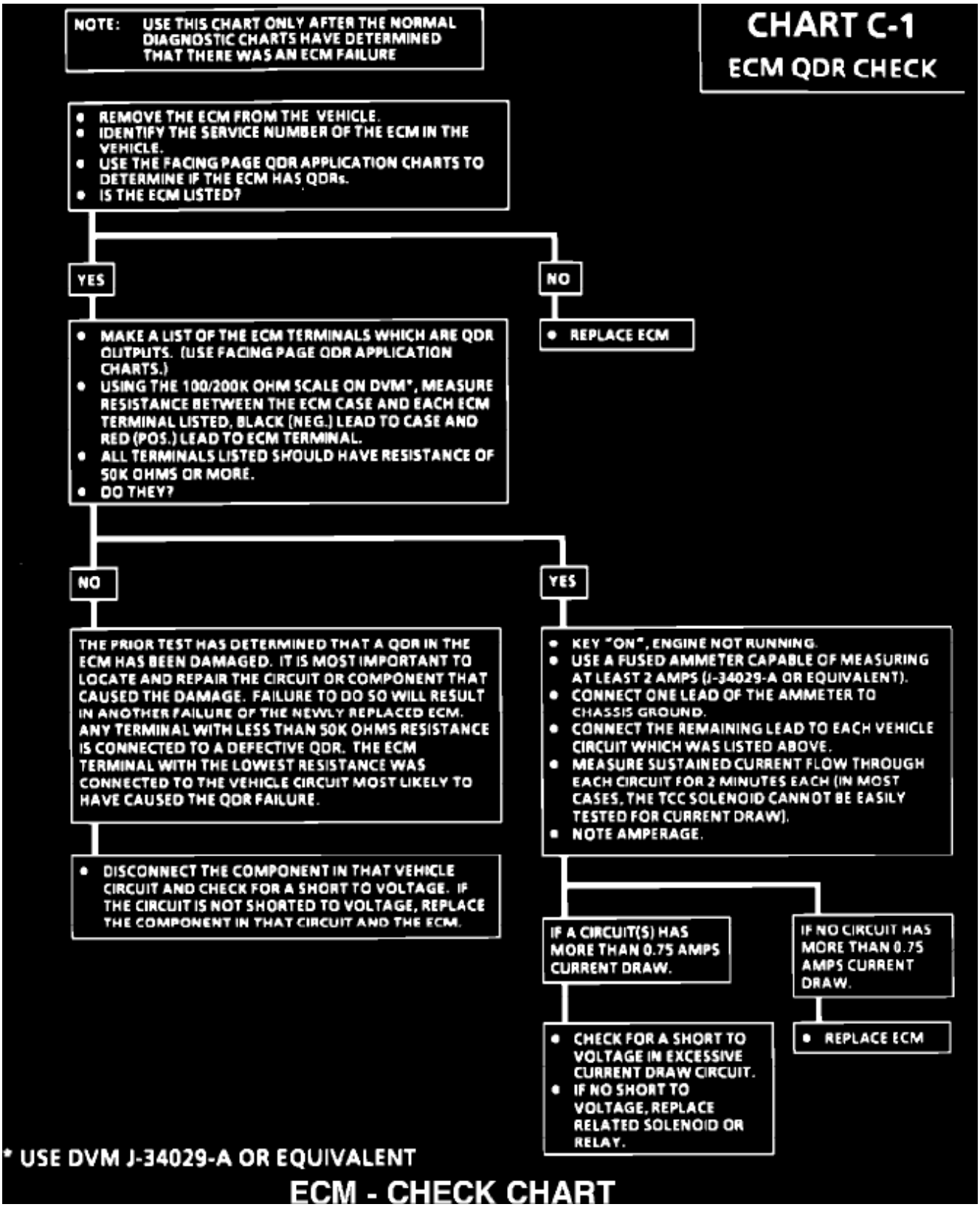
The following chart contains ECM QDR arrangement for all ECM models thru 1987.* Important Note:

^ Many 82-83 ECMs did not use QDRs, and will not appear on the chart.

^ This procedure will not work on any ECM Service Number which does not appear on the chart. (This is because such an ECM does not contain QDRs.)

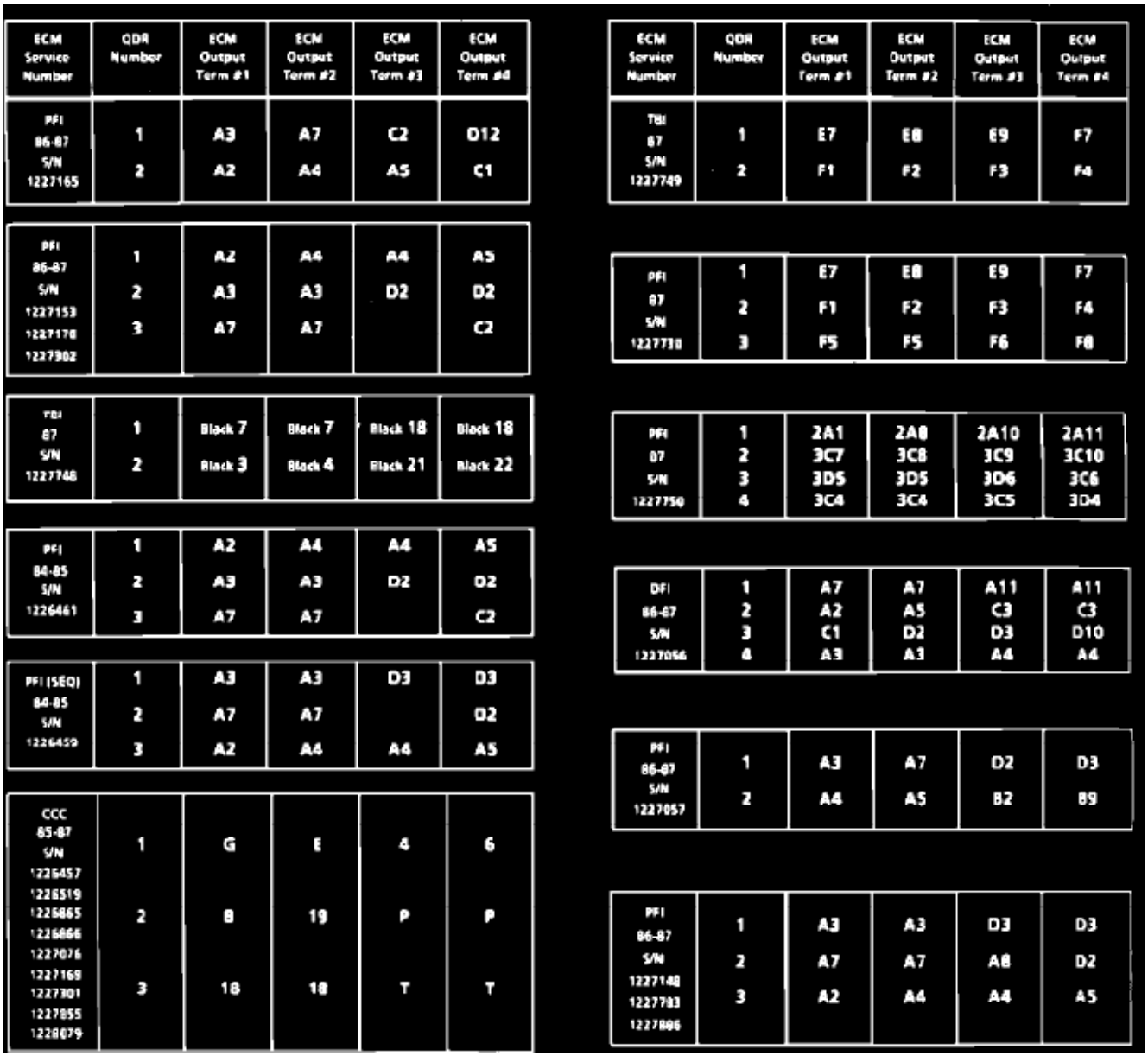
^ Not all available QDR outputs are used for ECM application. Verify circuit usage from the ECM wiring diagrams for each specific engine using Section "6E" of the service manual.

*Additional ECMs listed on page 4



ECM - CHECK CHART

ECM - CHECK CHART



ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
PFI 86-87 S/N 1227165	1	A3	A7	C2	D12
	2	A2	A4	A5	C1
PFI 86-87 S/N 1227153 1227170 1227902	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	A7	A7		C2
TBI 87 S/N 1227746	1	Black 7	Black 7	Black 18	Black 18
	2	Black 3	Black 4	Black 21	Black 22
PFI 84-85 S/N 1226461	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	A7	A7		C2
PFI (SEQ) 84-85 S/N 1226459	1	A3	A3	D3	D3
	2	A7	A7		D2
	3	A2	A4	A4	A5
CCC 85-87 S/N 1226457 1226519 1226865 1226866 1227076 1227169 1227301 1227855 1228079	1	G	E	4	6
	2	B	19	P	P
	3	18	18	T	T

ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
TBI 87 S/N 1227749	1	E7	E8	E9	F7
	2	F1	F2	F3	F4
PFI 87 S/N 1227738	1	E7	E8	E9	F7
	2	F1	F2	F3	F4
	3	F5	F5	F6	F8
PFI 87 S/N 1227750	1	2A1	2A8	2A10	2A11
	2	3C7	3C8	3C9	3C10
	3	3D5	3D5	3D6	3C6
	4	3C4	3C4	3C5	3D4
DFI 86-87 S/N 1227066	1	A7	A7	A11	A11
	2	A2	A5	C3	C3
	3	C1	D2	D3	D10
	4	A3	A3	A4	A4
PFI 86-87 S/N 1227057	1	A3	A7	D2	D3
	2	A4	A5	B2	B9
PFI 86-87 S/N 1227148 1227783 1227806	1	A3	A3	D3	D3
	2	A7	A7	A8	D2
	3	A2	A4	A4	A5

QDR APPLICATION CHART

QDR Application Chart For CHART C-1

The following chart contains ECM QDR arrangement for all ECM models thru 1987. Important Note:

^ Many 82-83 ECMs did not use QDRs, and will not appear on the chart.

^ This procedure will not work on any ECM Service Number which does not appear on the chart. (This is because such an ECM does not contain QDRs.)

^ Not all available QDR outputs are used for ECM application. Verify circuit usage from the ECM wiring diagrams for each specific engine using Section "6E" of the service manual.

ECM TERMINAL VOLTAGE

THIS ECM VOLTAGE CHART IS FOR USE WITH DIGITAL VOLTMETER TO FURTHER AID IN DIAGNOSIS. THESE VOLTAGES WERE DERIVED FROM A KNOWN GOOD VEHICLE. THE VOLTAGES YOU GET MAY VARY DUE TO LOW BATTERY CHARGE OR OTHER REASONS, BUT THEY SHOULD BE VERY CLOSE.

THE FOLLOWING CONDITIONS MUST BE MET BEFORE TESTING:

- ENGINE AT OPERATING TEMPERATURE
- CLOSED LOOP (ENGINE AT 1000 RPM)
- ENGINE AT 1000 RPM (FOR "ENGINE RUN" COLUMN)
- TEST TERMINAL NOT GROUNDED
- SCANNER NOT INSTALLED
- 2 WD

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open			
0	0	0	SENSOR RETURN	22	1
5	5	5	5V REFERENCE	21	2
.5-.65	2-3	*.5	VACUUM SENSOR SIGNAL	20	3
12	14	*.5	EGR	19	4
12	5-10 (var.)	*.5	M/C SOLENOID	18	5
			NOT USED	17	6
			NOT USED	16	7
			NOT USED	15	8
*.5	*.5	1.7	OXYGEN SENSOR – LO	14	9
*.5	*.5	*1.0	DIST. REF. PULSE – LO	13	10
*.5	1-2 (var.)	*.5	EST	12	11

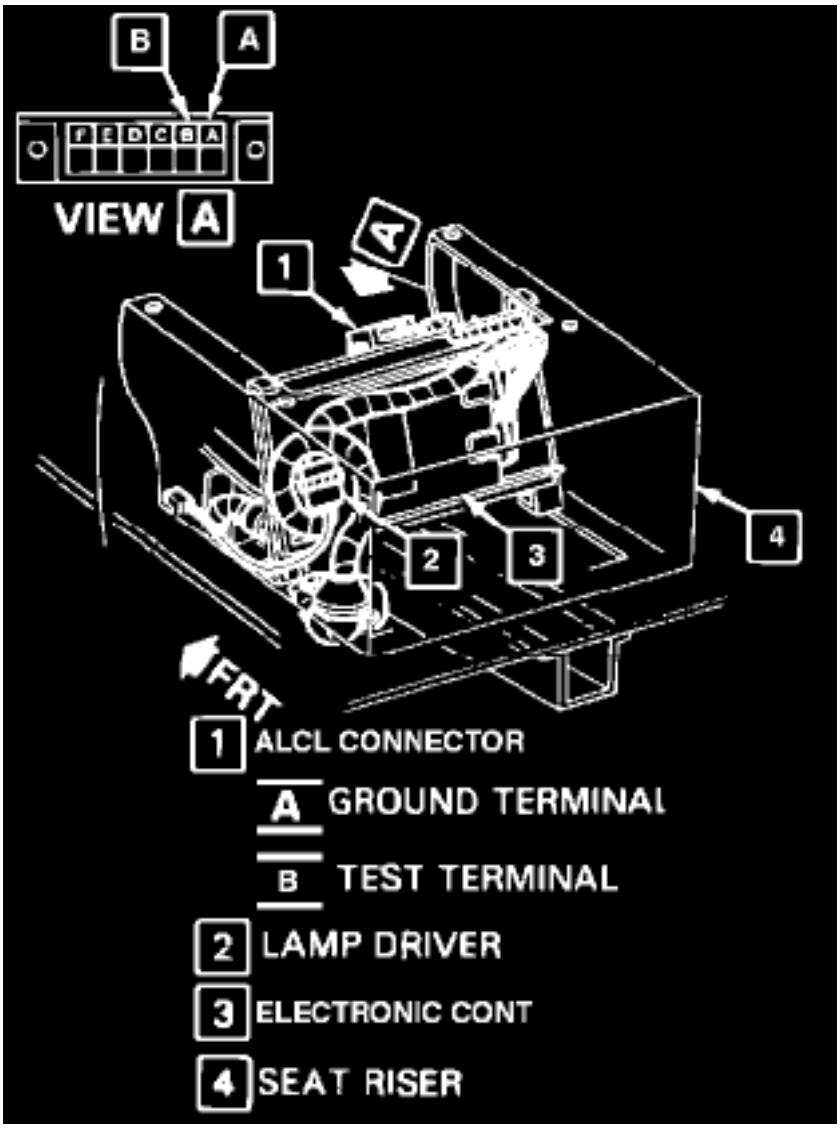
Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open	
NOT USED			
TPS SENSOR SIGNAL	*1.0 +5.0	*2.0	5.0
COOLANT TEMP. SENSOR SIGNAL	*3.0	*2.5	5.0
NOT USED			
DIAGNOSTIC TEST TERM	5	5	5
NOT USED			
COOLANT TEMP. SENSOR RETURN	0	0	0
NOT USED			
OXYGEN SENSOR – HI	.3-.45	.1-.9 (var.)	.3-.45
DIST. REF. PULSE – HI	*.5	1-2 (var.)	*.5
IGN. MODULE BY-PASS	*.5	3.7	*.5

			NOT USED	J	K
			NOT USED	H	L
10	*.5	*.5	"CHECK ENGINE" LAMP	G	M
			NOT USED	F	N
			NOT USED	E	P
			NOT USED	D	R
12	14	*.5	IGN. 1 POWER	C	S
12	.14	*.5	AIR DIVERT SOLENOID	B	T
0	0	0	GROUND (TO ENGINE)	A	U

NOT USED			
NOT USED			
NOT USED			
4TH GEAR SWITCH	*.5	*.5	12
TRANS CONVERTER CLUTCH SOLENOID	12	14	*.5
TROUBLE CODE MEMORY POWER	12	14	*.5
NOT USED			
PURGE	12	.12	*.5
GROUND (TO ENGINE)	0	0	0

* = Value Shown or Less Than that Value
† = Wide Open Throttle
(var.) = variable

ECM Terminal Identification & Voltage Specifications



Electronic Control Module

ECM TERMINAL VOLTAGE

THIS ECM VOLTAGE CHART IS FOR USE WITH DIGITAL VOLTMETER TO FURTHER AID IN DIAGNOSIS. THESE VOLTAGES WERE DERIVED FROM A KNOWN GOOD VEHICLE. THE VOLTAGES YOU GET MAY VARY DUE TO LOW BATTERY CHARGE OR OTHER REASONS, BUT THEY SHOULD BE VERY CLOSE.

THE FOLLOWING CONDITIONS MUST BE MET BEFORE TESTING:

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- CLOSED LOOP (ENGINE AT 1000 RPM)
- ENGINE AT 1000 RPM (FOR "ENGINE RUN" COLUMN)
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- SCANNER NOT INSTALLED
- 2 WD

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open			
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5	5	5	5V REFERENCE	21	2
.5-.65	2-3	*.5	VACUUM SENSOR SIGNAL	20	3
12	14	*.5	EGR	19	4
12	5-10 (var.)	*.5	M/C SOLENOID	18	5
			NOT USED	17	6
			NOT USED	16	7
			NOT USED	15	8
*.5	*.5	1.7	OXYGEN SENSOR – LO	14	9
*.5	*.5	*1.0	DIST. REF. PULSE – LO	13	10
*.5	1-2 (var.)	*.5	EST	12	11

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open	
NOT USED			
TPS SENSOR SIGNAL	*1.0 +5.0	*2.0	5.0
COOLANT TEMP. SENSOR SIGNAL	*3.0	*2.5	5.0
NOT USED			
DIAGNOSTIC TEST TERM	5	5	5
NOT USED			
COOLANT TEMP. SENSOR RETURN	0	0	0
NOT USED			
OXYGEN SENSOR – HI	.3-.45	.1-.9 (var.)	.3-.45
DIST. REF. PULSE – HI	*.5	1-2 (var.)	*.5
IGN. MODULE BY-PASS	*.5	3.7	*.5

			NOT USED	J	K
			NOT USED	H	L
10	*.5	*.5	"CHECK ENGINE" LAMP	G	M
			NOT USED	F	N
			NOT USED	E	P
			NOT USED	D	R
12	14	*.5	IGN. 1 POWER	C	S
12	.14	*.5	AIR DIVERT SOLENOID	B	T
0	0	0	GROUND (TO ENGINE)	A	U

NOT USED			
NOT USED			
NOT USED			
4TH GEAR SWITCH	*.5	*.5	12
TRANS CONVERTER CLUTCH SOLENOID	12	14	*.5
TROUBLE CODE MEMORY POWER	12	14	*.5
NOT USED			
PURGE	12	.12	*.5
GROUND (TO ENGINE)	0	0	0

* = Value Shown or Less Than that Value
† = Wide Open Throttle
(var.) = variable

ECM Terminal Identification & Voltage Specifications

Engine Control Module: Description and Operation "E" Cell

The ``E'' cell controls voltage at ECM terminal 15. For the first 25,000 miles of vehicle operation, voltage is nearly zero. The ``E'' cell then causes voltage to rise to approximately 5 volts. This provides a different control value for some systems.

Engine Control Module: Description and Operation Electronic Spark Timing (EST)

Electronic Spark Timing is used on all Calif. vehicles. The EST distributor contains no centrifugal or vacuum advance and uses a seven terminal High Energy Ignition (HEI) module. A four-terminal connector is used for EST use, in addition to the connectors normally found on HEI distributors. All spark timing changes are controlled by the ECM, which monitors information from the various engine sensors, computes the correct spark timing, then signals the distributor to adjust the timing accordingly. The distributor operates without ECM control during cranking or when setting basic ignition timing. This is known as the ``Bypass'' mode and it is determined by the bypass lead from the ECM to the distributor. When the bypass lead voltage is 5 volts, the ECM performs the spark timing function. However, when the bypass lead is grounded or open circuited, the HEI module assumes the spark control function. Disconnecting the four-terminal EST connector causes the engine to automatically operate in the bypass mode. The EST connector should be disconnected whenever setting basic ignition timing.

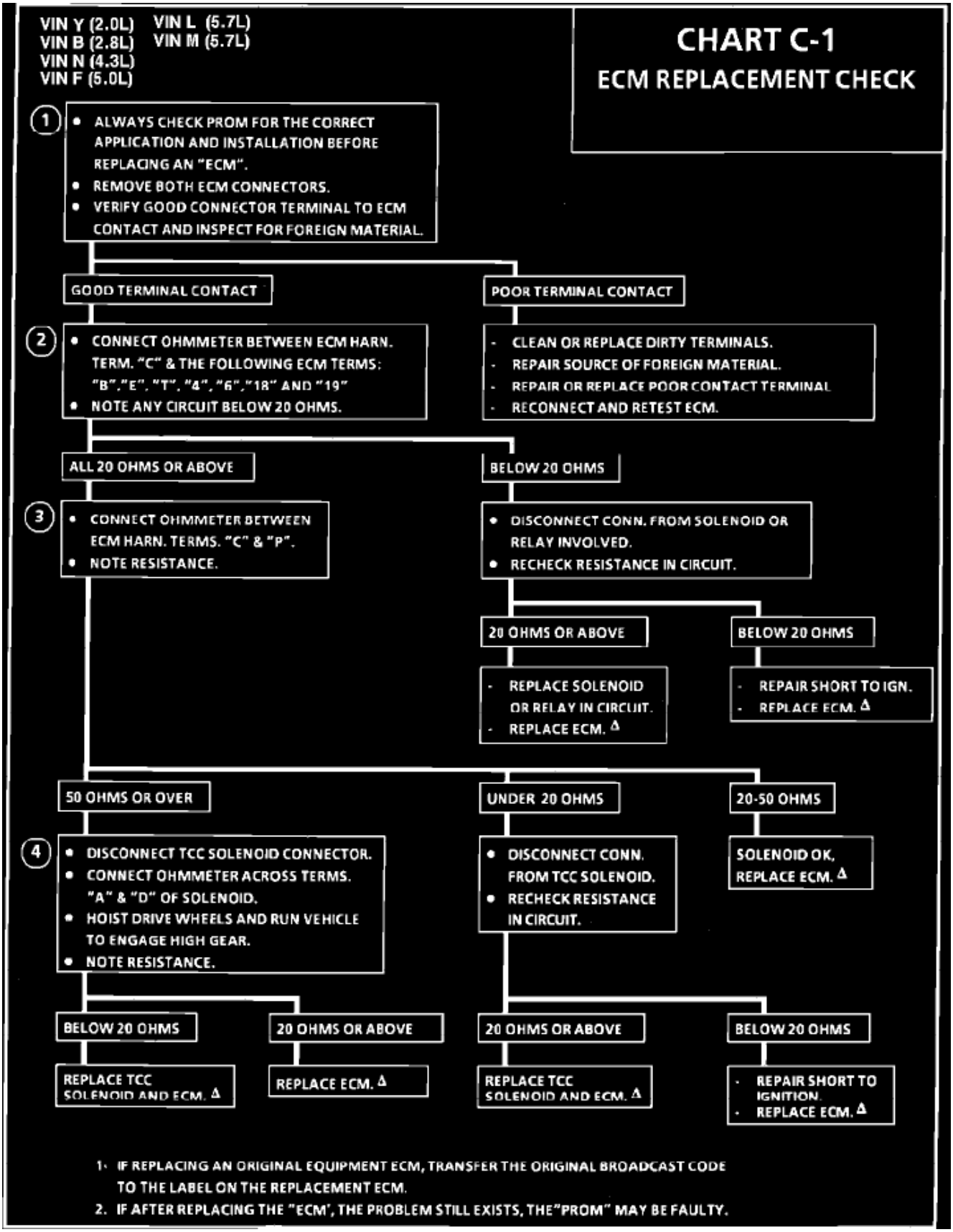
The ECM is the control center of the C3 system. Its function is to monitor input information from the various sensors, process this information, then generate output commands to the various systems that affect the performance of the vehicle. The ability of the ECM to perform these functions is dependent upon a removable calibration unit called the PROM. There are specific ECM/PROM combinations for each vehicle and they should not be interchanged. The ECM also performs the diagnostic function of the C3 system, alerting the driver through a ``Check Engine'' light should any problem in the system arise and storing a code or series of codes which the technician uses as an aid in making repairs.

Engine Control Module: Description and Operation Trouble Code Memory

The ECM is capable of sensing certain system malfunctions, storing data related to these malfunctions in the trouble code memory and alerting the operator of the malfunctions through the instrument panel mounted "Check Engine" lamp. If a system malfunction occurs while the engine is running, the ``Check Engine'' lamp will light and a trouble code will be stored in the ECM memory. The lamp will remain on with the engine running until malfunction is corrected. If the malfunction is intermittent, the lamp will go out but the code will remain stored in the trouble code memory.

Engine Control Module: Diagnostic Trouble Code Descriptions

For information regarding B, C, P, U and Manufacturer Code Descriptions -

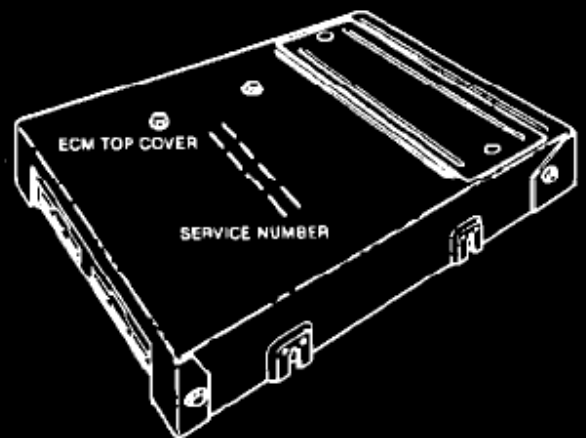


Engine Control Module: Component Tests and General Diagnostics

Chart C-1 - ECM Replacement Check

Remove or Disconnect (Figures 1 and 2)

1. New electronic control module out of its packaging and check the service number to make sure it is the same as the faulty ECM.
2. Access cover so that PROM from faulty ECM may be installed in replacement ECM.



Important

REPLACEMENT ELECTRONIC CONTROL MODULE (ECM) IS SUPPLIED WITHOUT AN ENGINE CALIBRATION UNIT (PROM) SO CARE SHOULD BE TAKEN WHEN REMOVING THE PROM FROM THE DEFECTIVE ECM AS IT WILL BE REUSED IN THE NEW ECM. REFER TO PROM REPLACEMENT PROCEDURE AS DETAILED IN CODE 51.

ECM Replacement Check for Chart C-1

CHART C-1 - ECM REPLACEMENT CHECK

Circuit Description: Prior to replacing an ECM, the circuit involved must be tested for:

^ Poor connector terminal to ECM contact;

^ Direct battery voltage on an ECM ground circuit from a short to B+; or

^ Shorted solenoid or relay. If a short is found, the circuit must be repaired prior to replacing the ECM to prevent repeat ECM failures

Test Description:

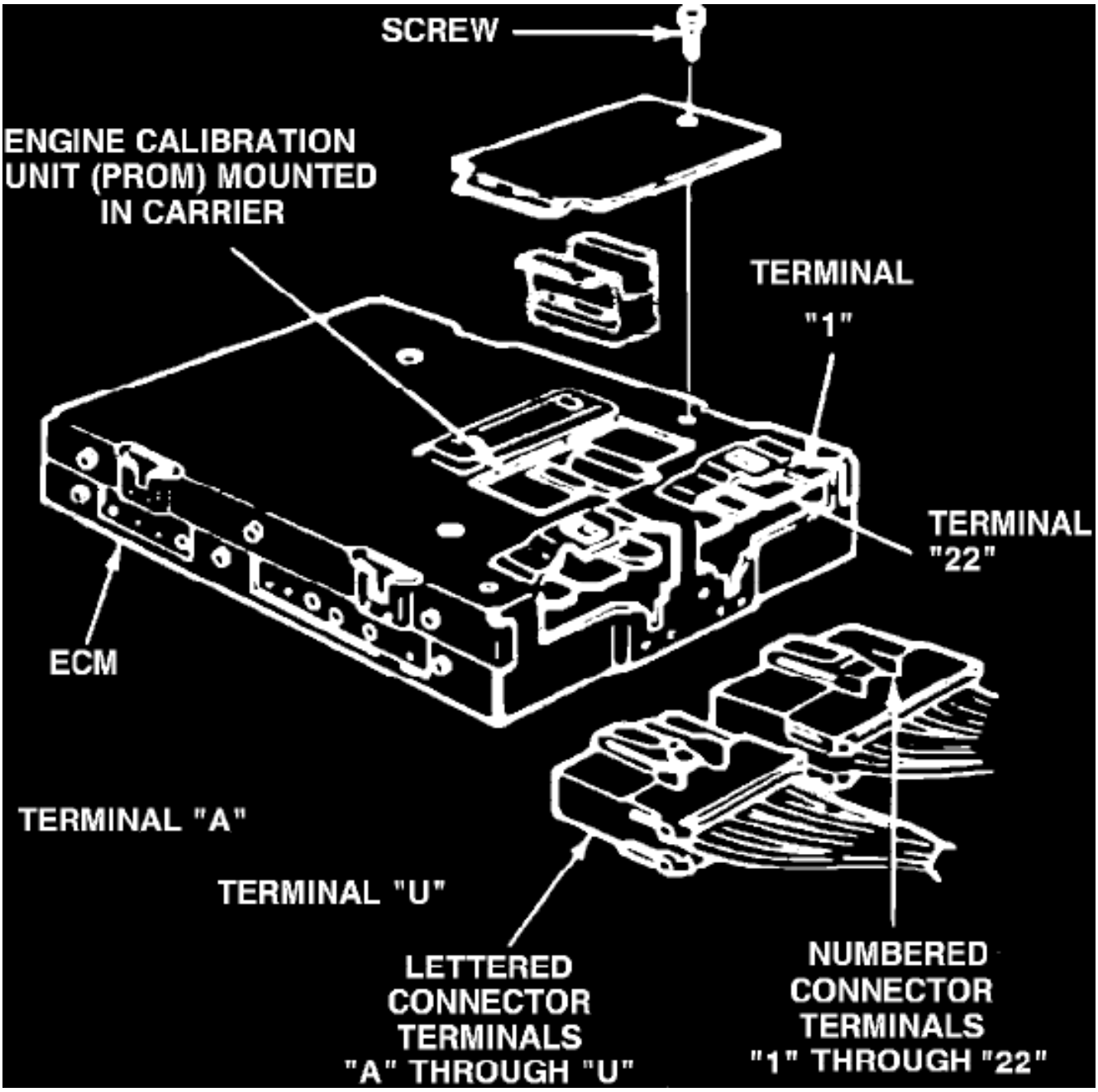
1. Check for good terminal contact due to weak or dirty terminals. Remove terminal to inspect. Replace if broken or dirty. If coolant is present, replace coolant sensor and connector. Also, replace ECM connector terminal and blow coolant out of harness. Clean connector with alcohol or spray contact cleaner and replace ECM.

2. Check for a short to ignition or shorted solenoid or relay. All terminals must be tested since several are connected internally in the ECM. A short in one circuit may cause another circuit in the ECM to be inoperative that does not have an external fault, but was the cause of "driver's complaint." Any circuit testing below 20 ohms is shorted to ignition, or shorted across the relay or solenoid.

3. Check for shorted TCC solenoid. Some transmissions have a normally open 4th gear switch in series with the solenoid. The ohmmeter will read infinite resistance (open circuit) in these cases. If the reading is less than 20 ohms, a short to ignition or faulty solenoid exists. A normal solenoid will

read between 20 - 50 ohms.

4. Check for shorted TCC circuit in units with a 4th gear switch. The vehicle must be in 4th gear to close the switch to obtain a resistance reading. A normal solenoid will read between 20-50 ohms.



Engine Control Module: Service and Repair

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB #88-42, DATED 09/87

Some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB #88-283-6E, DATED 7/88

To prevent possible electrostatic discharge damage to electrical components:

-Do not touch the ECM connector pins or soldered components on the circuit board. -When handling a PROM, CAL-PAK or MEM-CAL, do not touch the component leads and do not remove integrated circuit from carrier.

Fig. 249 Electronic Control Module (ECM)

1. Disconnect battery ground cable.

2. Disconnect numbered and lettered connectors from ECM, Fig. 249.

3. Remove ECM mounting hardware, then the ECM from the passenger compartment.

4. Reverse procedure to install. Replacement Electronic Control Modules are not equipped with engine calibration units (PROM). If PROM is to be reused, care should be taken when removing it from defective ECM. See ``Prom, Replace'' for proper removal procedure.

Engine	Year	Resistance (ohms)
All TBI	1981-90	20 min.

Idle Speed Control Motor: Electrical Specifications

IDLE SPEED CONTROL

Measured between terminals A& B and C & D.

Idle Speed Control Motor: Mechanical Specifications

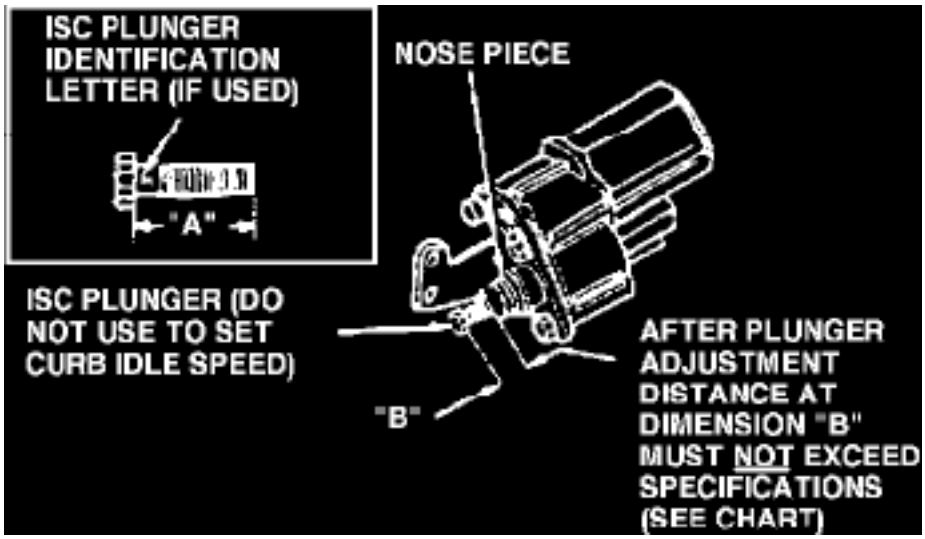
ISC PLUNGER ADJUSTMENT CHART

Identification Letter	Plunger Length Dimension "A"	Plunger Length Dimension "B"
None	14.1 mm (9/16")	5.6 mm (7/32")
None	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/6'4")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1LL)	17.1 mm (43/64")
L	27.5 mm (1 -3/32")	19.0 mm (3/4")
J	30.0 mm (1-3/16")	21.5 mm (27/32")
N	32.0 mm (1-17/64")	23.5 mm (59/64")
T	34.0 mm (1-11/32")	25.5 mm (1")

Idle Speed Control Motor: Description and Operation

The ISC assembly controls engine idle speed according to ECM programming.

When the throttle lever rests against the ISC plunger, the ISC acts as a dashpot on throttle closing per second.



Idle Speed Control Motor: Adjustments

On engines equipped with an idle speed control motor, idle speed is controlled by an electrical signal from the ECM. Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows. See Underhood Emission Label.

Plunger - Maximum Adjustment

NOTE: Prior to adjustment, check for an identification letter on the ISC plunger. If NO LETTER appears, using Tool J-29607, BT-8022 or equivalent,

remove plunger from ISC Unit. Then, measure length of plunger from back side of plunger head to end of plunger screw - Dimension "A". Record this measurement for use at Step 17. Reinstall plunger in ISC unit, turning plunger into a preset position so that the distance measured from the back side of the plunger head to the ISC nosepiece is LESS THAN Dimension "B".

ISC PLUNGER ADJUSTMENT CHART

Identification Plunger Length Plunger Length

Letter Dimension "A" Dimension "B"

None 14.1 mm (9/16") 5.6 mm (7/32")

None 16.3 mm (41/64") 8.0 mm (5/16")

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Y 20.5 mm (51/64") 12.0 mm (15/32")

S 21.2 mm (27/32") 12.7 mm (1/2")

Z 22.5 mm (7/8") 14.0 mm (35/64")

G 23.2 mm (29/32") 14.7 mm (37/64")

E 25.6 mm (1LL) 17.1 mm (43/64")

L 27.5 mm (1 -3/32") 19.0 mm (3/4")

J 30.0 mm (1-3/16") 21.5 mm (27/32")

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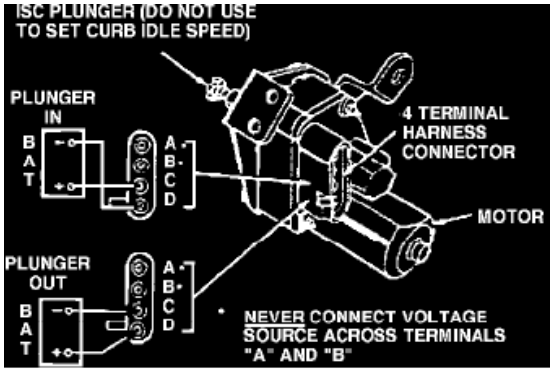
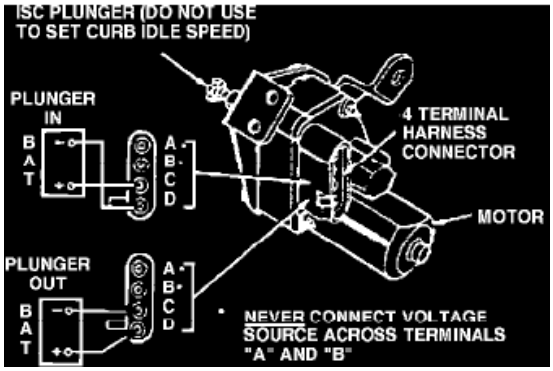




Idle Speed Control Assembly - Typical

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures - see emission label for latest instructions.

2. Before starting engine, place transmission in PARK (AUTO trans.) or NEUTRAL (MANUAL transmission), set parking brake, and block drive wheels.

3. Connect dwell meter to mixture control (M/C) solenoid dwell lead. Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF".

5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary).

6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

7. Unplug connector from ISC motor.

8. Fully retract ISC plunger by applying 12 volts to terminal "C" and grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

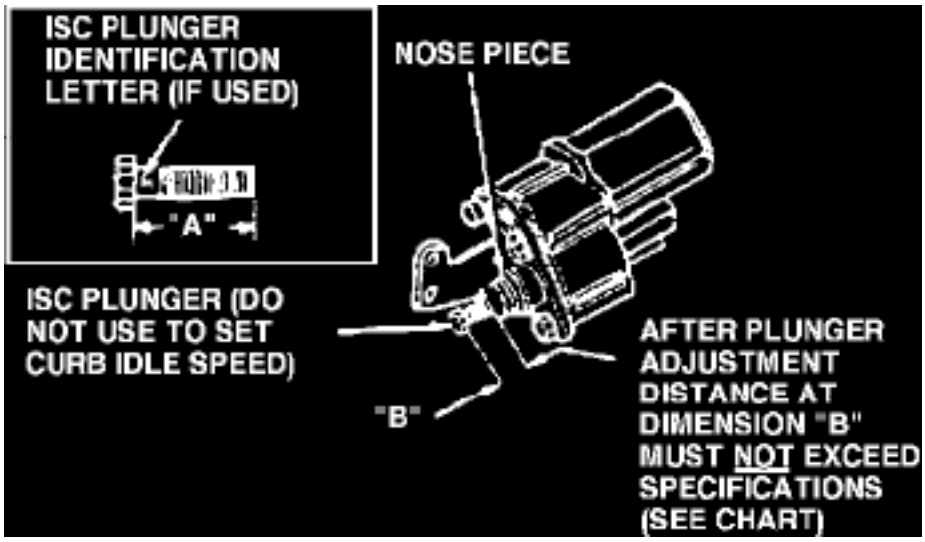
9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place A.T. transmission in Drive.

11. With ISC plunger fully retracted, adjust carburetor base (slow) idle stop screw (minimum authority) to the RPM shown in the carburetor charts.

12. PLACE TRANSMISSION IN PARK (AUTO TRANS.) OR NEUTRAL (MANUAL TRANS.).

Idle Speed Control Assembly - Typical



13. Fully extend ISC Plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC Motor Connection. Leave power

applied only long enough to extend the plunger.

14. Manual transmission: Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown

in carburetor charts.

15. Automatic Transmission:

a. With transmission in PARK, using Tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

b. With parking brake set and drive wheels blocked, place transmission in drive. Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown in carburetor charts.

Plunger - Maximum Adjustment

16. Recheck ISC "Maximum Authority" RPM with voltage applied to Motor (Step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nose piece, Dimension "B". Dimension must NOT exceed

that shown by plunger type as either identified by plunger length or letter identification.

18. Fully retract ISC Plunger (Step 8). Place transmission in PARK (AUTO Trans.) or NEUTRAL (MANUAL Transmission) and turn ignition "Off".

Disconnect 12 Volt Power source, Ground lead, Tachometer and Dwell Meter. With ignition "Off" reconnect four Terminal Harness connectors to ISC Motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By restoring

the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Engine	Year	Resistance (ohms)
All TBI	1981-90	20 min.

Idle Speed Control Motor: Electrical Specifications

IDLE SPEED CONTROL

Measured between terminals A& B and C & D.

Idle Speed Control Motor: Mechanical Specifications

ISC PLUNGER ADJUSTMENT CHART

Identification Letter	Plunger Length Dimension "A"	Plunger Length Dimension "B"
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Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1LL)	17.1 mm (43/64")
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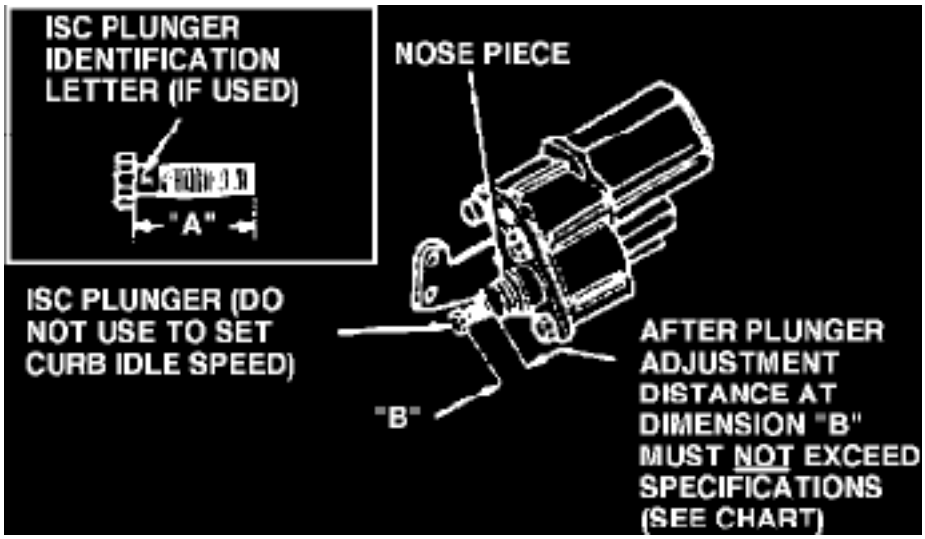
J	30.0 mm (1-3/16")	21.5 mm (27/32")
N	32.0 mm (1-17/64")	23.5 mm (59/64")
T	34.0 mm (1-11/32")	25.5 mm (1")

Idle Speed Control Motor: Description and Operation

The ISC assembly controls engine idle speed according to ECM programming.

When the throttle lever rests against the ISC plunger, the ISC acts as a dashpot on throttle closing per second.



Idle Speed Control Motor: Adjustments

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Plunger - Maximum Adjustment

NOTE: Prior to adjustment, check for an identification letter on the ISC plunger. If NO LETTER appears, using Tool J-29607, BT-8022 or equivalent,

remove plunger from ISC Unit. Then, measure length of plunger from back side of plunger head to end of plunger screw - Dimension "A". Record this measurement for use at Step 17. Reinstall plunger in ISC unit, turning plunger into a preset position so that the distance measured from the back side of the plunger head to the ISC nosepiece is LESS THAN Dimension "B".

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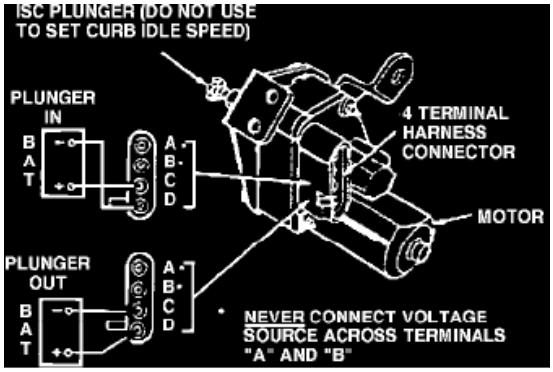
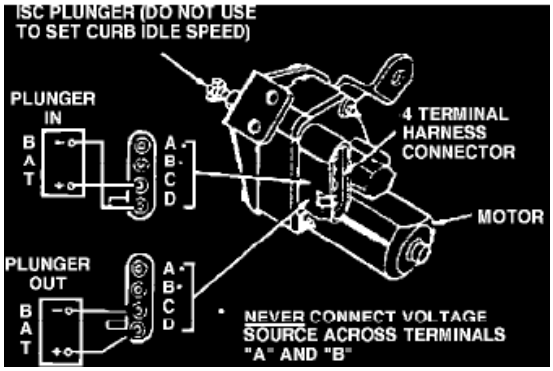




Idle Speed Control Assembly - Typical

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures - see emission label for latest instructions.

2. Before starting engine, place transmission in PARK (AUTO trans.) or NEUTRAL (MANUAL transmission), set parking brake, and block drive wheels.

3. Connect dwell meter to mixture control (M/C) solenoid dwell lead. Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF".

5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary).

6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

7. Unplug connector from ISC motor.

8. Fully retract ISC plunger by applying 12 volts to terminal "C" and grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

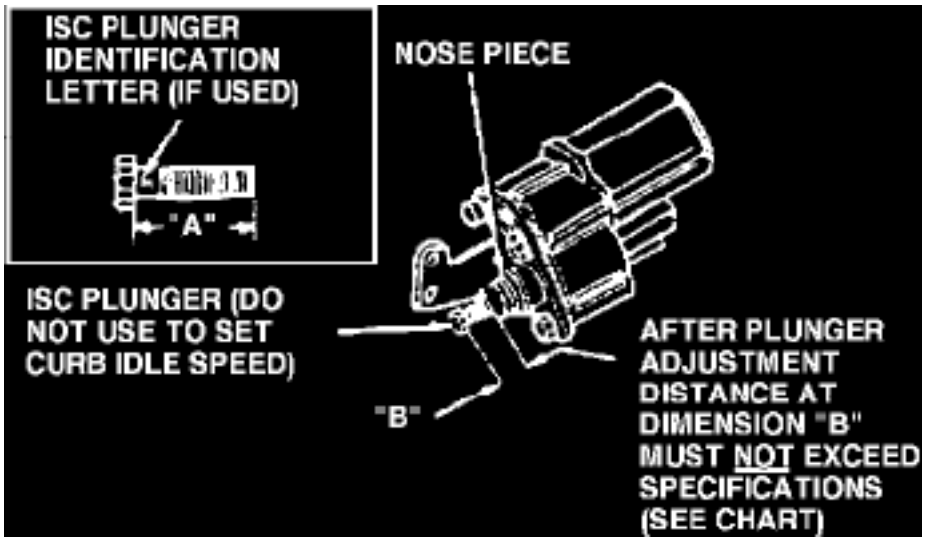
9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place A.T. transmission in Drive.

11. With ISC plunger fully retracted, adjust carburetor base (slow) idle stop screw (minimum authority) to the RPM shown in the carburetor charts.

12. PLACE TRANSMISSION IN PARK (AUTO TRANS.) OR NEUTRAL (MANUAL TRANS.).

Idle Speed Control Assembly - Typical



13. Fully extend ISC Plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC Motor Connection. Leave power

applied only long enough to extend the plunger.

14. Manual transmission: Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown

in carburetor charts.

15. Automatic Transmission:

a. With transmission in PARK, using Tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

b. With parking brake set and drive wheels blocked, place transmission in drive. Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown in carburetor charts.

Plunger - Maximum Adjustment

16. Recheck ISC "Maximum Authority" RPM with voltage applied to Motor (Step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nose piece, Dimension "B". Dimension must NOT exceed

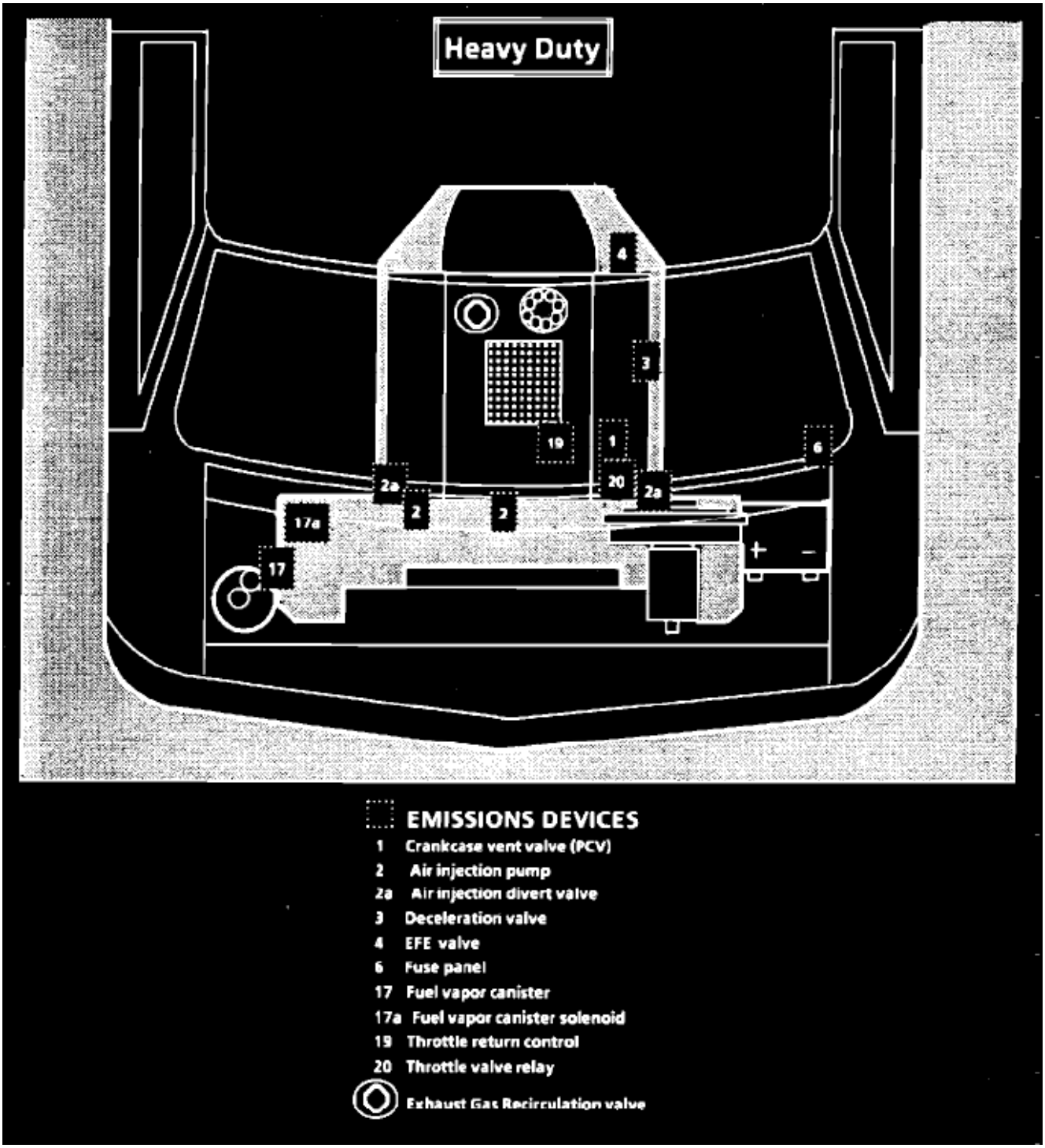
that shown by plunger type as either identified by plunger length or letter identification.

18. Fully retract ISC Plunger (Step 8). Place transmission in PARK (AUTO Trans.) or NEUTRAL (MANUAL Transmission) and turn ignition "Off".

Disconnect 12 Volt Power source, Ground lead, Tachometer and Dwell Meter. With ignition "Off" reconnect four Terminal Harness connectors to ISC Motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By restoring

the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.



Idle Up Control Relay: Locations

Underhood & Engine Components

LH Top Front Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Relays and Modules > Relays and Modules - Powertrain Management > Relays and Modules - Ignition System > Electronic Spark Timing <--> [Electronic Spark Control Module] > Component Information > Locations > Typical Electronic Spark System (ESC)

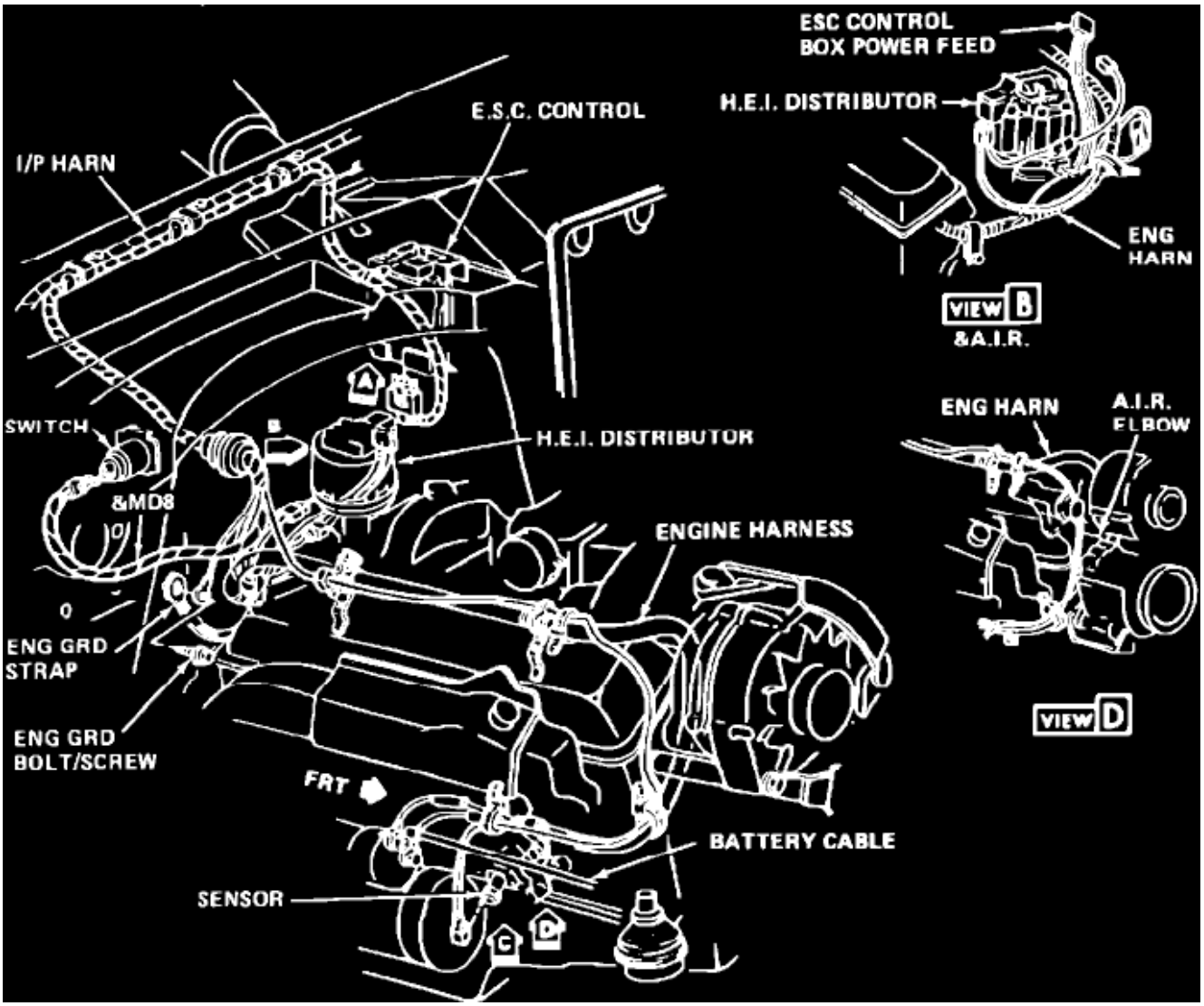


Fig. 46 Typical Electronic Spark System (ESC)

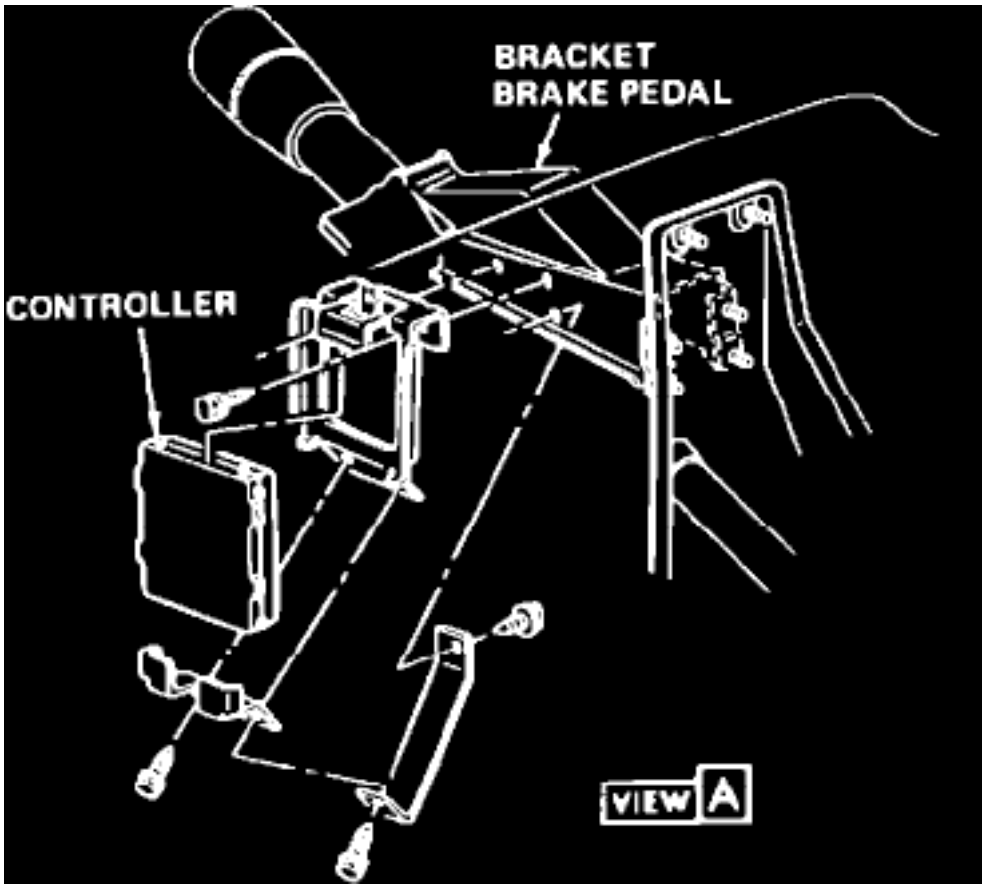
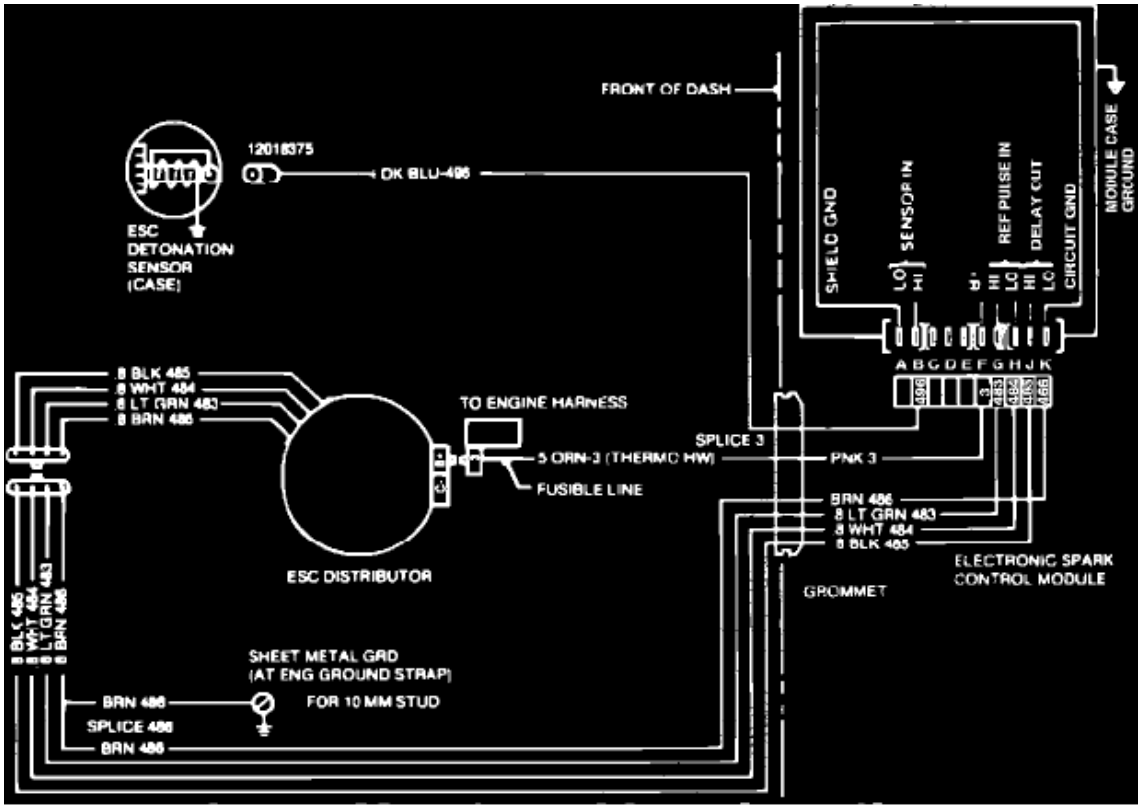
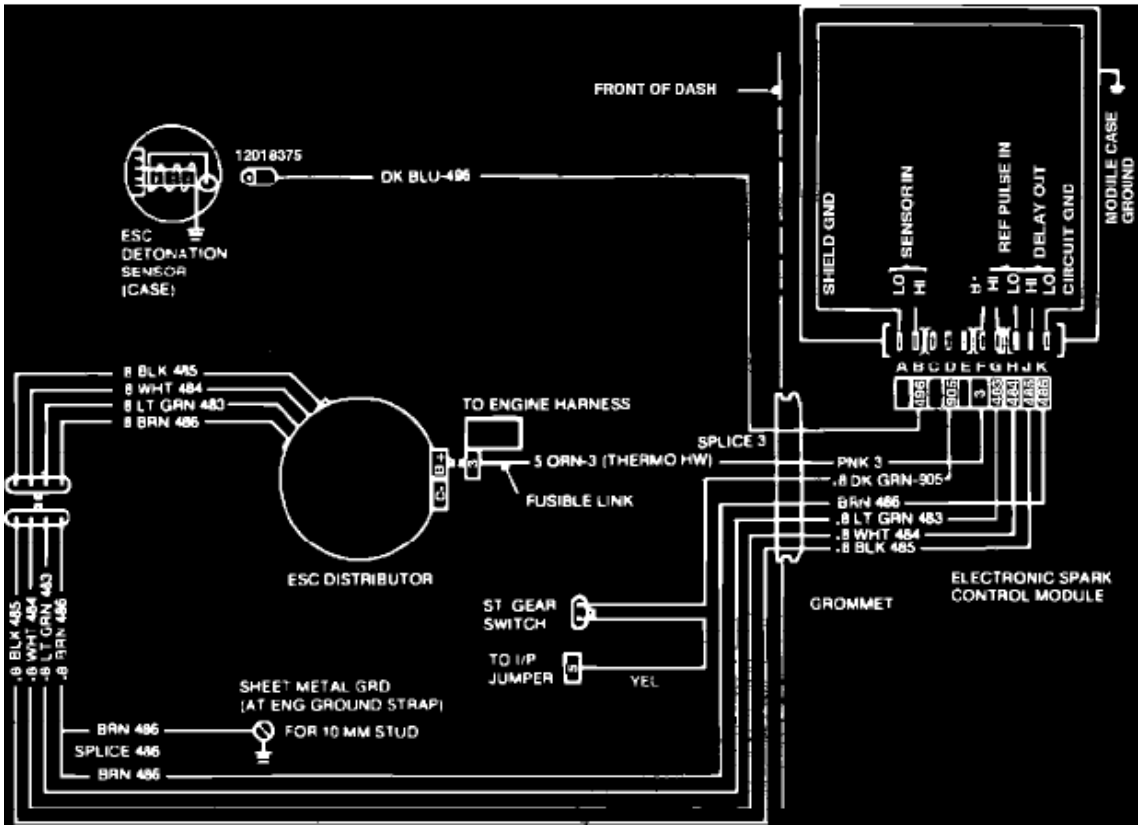


Fig. 47 Typical ESC Controller





Electronic Spark Timing: Testing and Inspection

Use the following procedures to diagnose ESC system malfunctions only. To diagnose general ignition system malfunctions, refer to ``High Energy Ignition (HEI) System Diagnosis.''

Fig. 5 ESC system wiring schematic. 1984-86 models w/manual 4 speed top loader transmission

Fig. 6 ESC system wiring schematic. 1984-86 models w/manual 3 & 4 speed side loader transmission

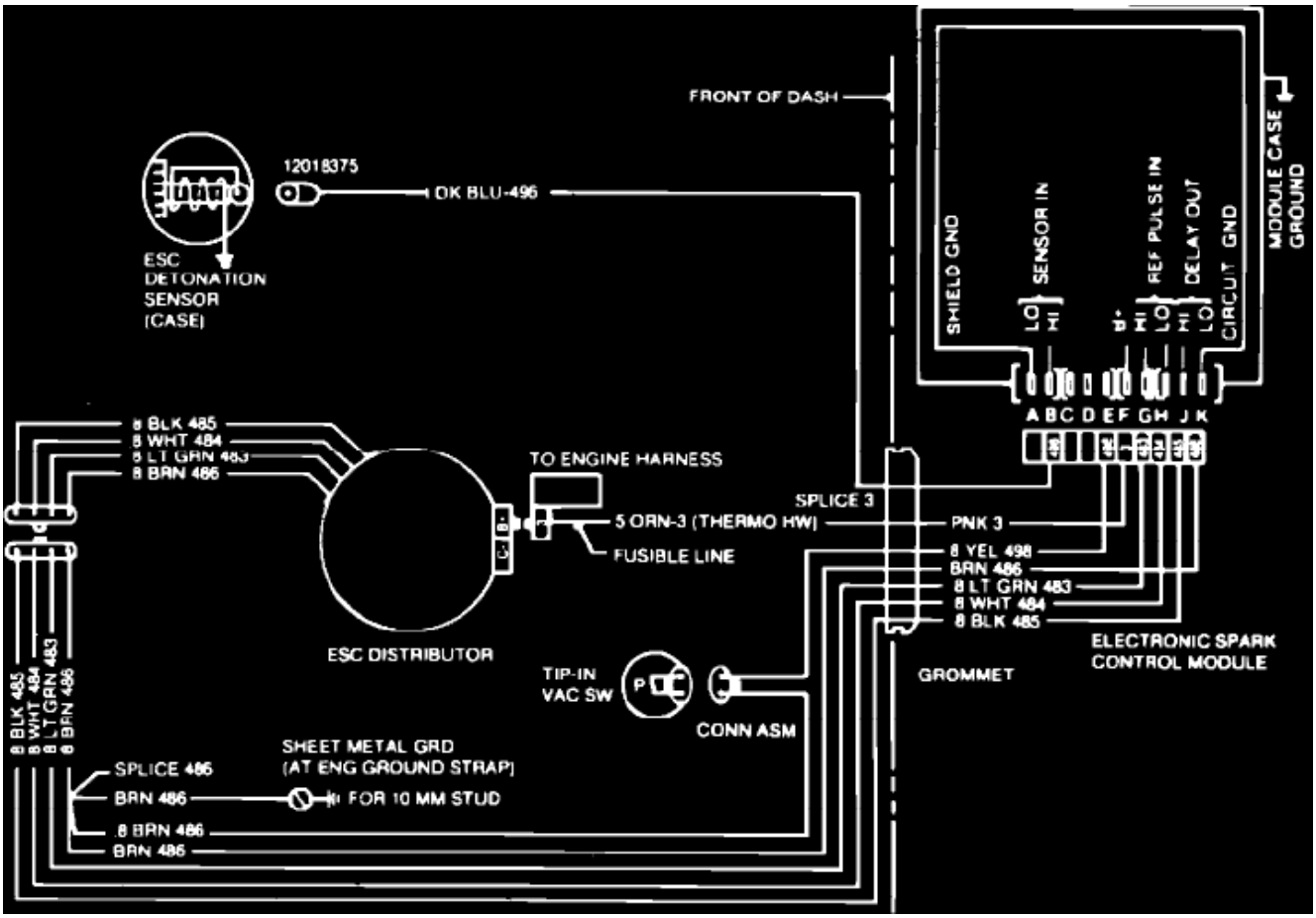


Fig. 7 ESC system wiring schematic. 1984-86 models w/auto. trans.

1984-86 MODELS

Engine Cranks But Will Not Start

1. Check for spark at at the ends of at least 2 spark plug wires using tester ST-125 or equivalent. If spark is observed, malfunction is not in ignition system.

2. If no spark is observed, disconnect 4 pin connector to distributor, connect jumper wire between pins A and C on distributor side of connector, Figs. 5, 6 and 7, and attempt to start engine. If engine starts, proceed to step 3. If engine does not start, proceed as follows:

a. Remove jumper wire and reconnect 4 pin connector to distributor. Turn on ignition and measure voltage at pins F and K of controller 10 pin

connector. If voltage is less than 11.6 volts, check feed circuit and repair as needed.

b. Set voltmeter on 2 volt scale and measure voltage between pins J and K of 10 pin connector while cranking engine. If reading is .75 volts or

greater, ESC system is satisfactory.

c. Set voltmeter on 2 volt scale and measure voltage between pins G and H of 10 pin connector while cranking engine. If reading is .20 volt or

greater, controller is defective. If reading is less than .20 volt, pole piece is defective.

3. Stop engine and remove jumper wire from distributor.

4. Connect suitable high resistance test lamp between distributor TACH terminal and ground, then turn on ignition. If test lamp lights, proceed to step 6.

5. If lamp does not light at TACH terminal, connect lamp between BAT terminal and ground and turn on ignition. If lamp does not light, repair feed circuit to ignition.

6. Crank engine with test lamp connected between distributor TACH terminal and ground. If test lamp flickers, system is satisfactory.

7. If test lamp does not flicker as engine is cranked, connect lamp between BAT terminal and pin A on distributor side of 4 pin ESC connector, then tap on coil. If coil makes a clicking noise when tapped, pole piece is defective.

8. If coil does not click, remove distributor cap an disconnect and reconnect pole piece electrical connector. If coil still does not click when tapped, ignition module is defective.

Poor Engine Performance

1. Disconnect distributor 4 pin connector, connect pins A and C on distributor side of connector with jumper wire, and road test vehicle.

2. If engine performance is still poor, cause is not in ESC system. If proper engine performance is restored by disconnecting ESC controller from distributor, remove jumper wire, reconnect 4 pin connector and proceed to next step.

3. Disconnect 10 pin connector from ESC controller, inspect terminals for proper contact, shots and opens, repair as needed, then recheck system operation.

4. If problem persists, disconnect 10 pin connector and measure resistance between pins B and K in connector. Reading should be 98-99 Kohms.

5. If resistance is not as specified, disconnect electrical connector from knock sensor and measure resistance between sensor terminal and ground. If resistance is 98-99 ohms, repair wiring between

knock sensor and controller. If resistance is not 98-99 Kohms, knock sensor is defective.

6. Reconnect 10 pin connector to controller and measure voltage between pins F and K with ignition on. If voltage reading is less than 11.6 volts repair feed circuit as needed.

7. Set voltmeter on 20 volt AC scale and measure voltage between connector pins H and K with ignition on. If reading is less than .20 volt, inspect system wiring and repair as needed. If reading is greater than .20 volt, ensure all connectors are properly seated, then road test vehicle. If problem persists, replace ESC controller.

Engine Detonation

1. Inspect connector and wiring to knock sensor and repair as needed.

2. Connect suitable spark advance tester to engine, run engine until it reaches normal operating temperature and set engine to run at a minimum of 1200 RPM, then observe ignition timing while tapping on exhaust manifold. If ignition timing retards when manifold is tapped, ESC system is operating properly.

3. Stop engine, disconnect 10 pin connector from ESC controller and measure resistance between pins B and K of connector. If resistance is not 98-99 ohms, proceed to step 5.

4. Measure resistance between pins H and K in connector. If resistance is 14-16 ohms, replace controller. If resistance is not 14-16 ohms, repair wiring to controller.

5. Disconnect electrical connector from knock sensor and measure voltage at sensor terminal with engine running at 2000 RPM. If reading is not .08 volt or more, knock sensor is defective.

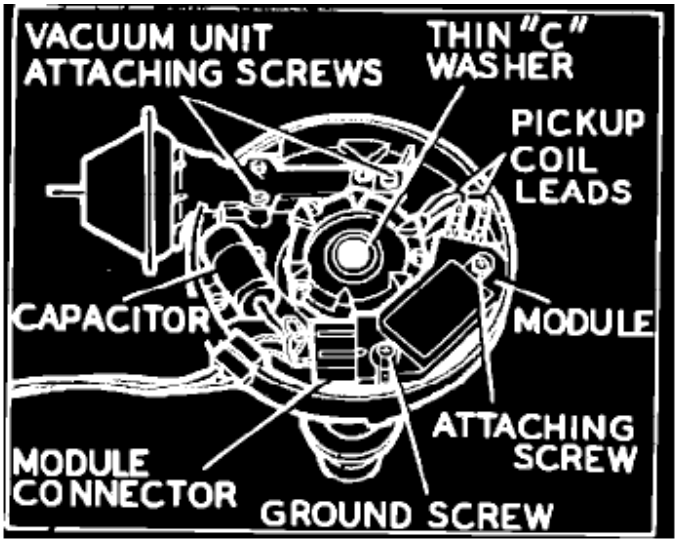
6. Stop engine. If knock sensor voltage output is satisfactory, check wiring between knock sensor and terminal B of controller and between controller terminal K and ground and repair as needed.

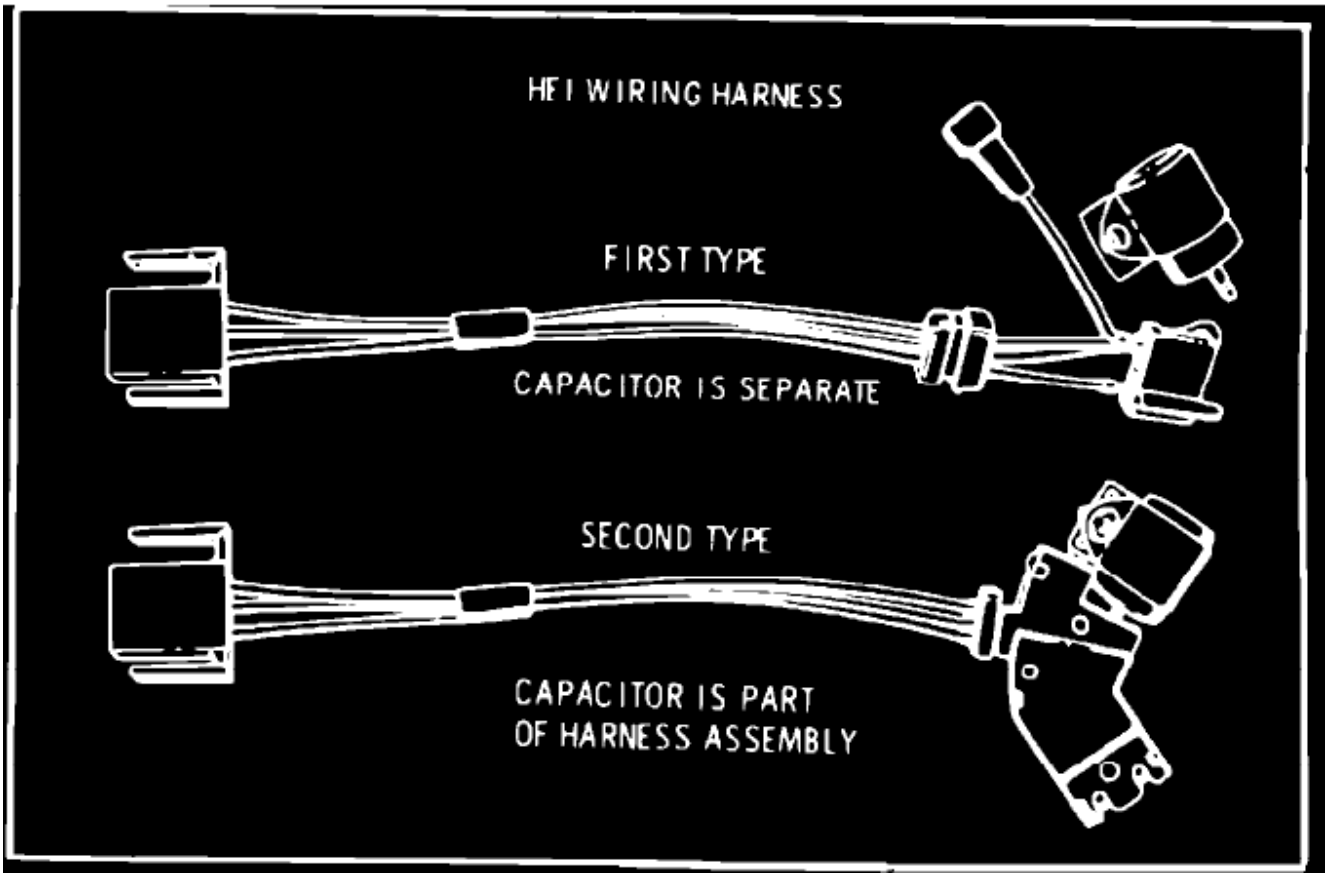
Ignition Control Module: Testing and Inspection

If the vehicle cranks for at least 5 seconds and the Engine Control Module doesn't see a referance signal, some Models will set a code, 42 (Hard) or 12 (Soft). If your vehicle has one of these codes, begin with the Diagnostic System Check in Computers and Controls, then proceed to the Trouble Code Chart (Yes, some vehicles have a DTC Chart for Code 12).

If the vehicle does not set a code, begin with the Diagnostic System Check, and it will send you to a Diagnostic Chart that checks for your particular condition.

These types of tests are found under Computers and Control Systems. See: Powertrain Management/Computers and Control Systems/Testing and Inspection





Ignition Control Module: Service and Repair

Fig. 13 Distributor component identification

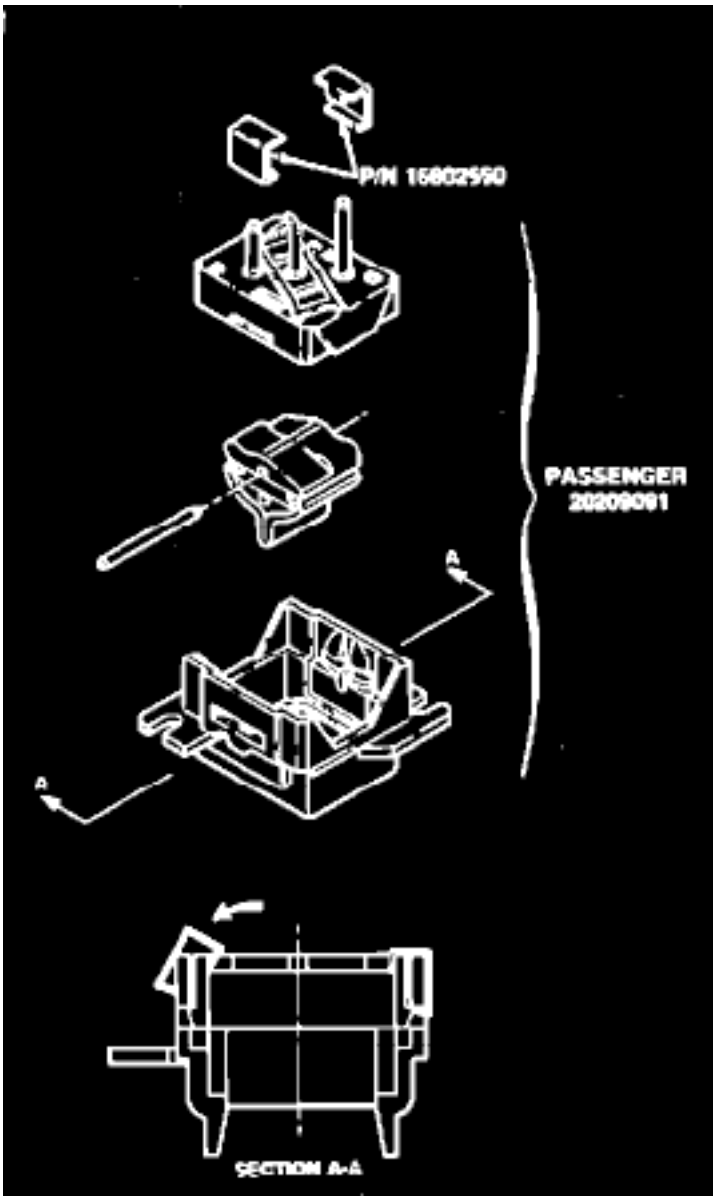
Fig. 14 Ignition module harness identification

1. Disconnect wiring harness connector at side of distributor cap and remove distributor cap.

2. Remove rotor and disconnect wires from module terminals.

3. Remove two mounting screws and remove module, Fig. 13. Two types of H.E.I. wiring harness are used, Fig. 14. The second type is a wiring harness, connector and capacitor which is serviced as an assembly.

4. Reverse procedure to install. Prior to installation, coat bottom of new module with dielectric grease (furnished with new module) to aid in heat transfer into distributor housing. Failure to apply grease will cause excessive heat at module and premature module failure.



Power Door Lock Switch: Customer Interest Electric Door Lock Switch - Separated While Installed

Number: 86-182

Section: 9

Date: OCT., 1986

Subject: ELECTRIC DOOR LOCK SWITCH SEPARATION

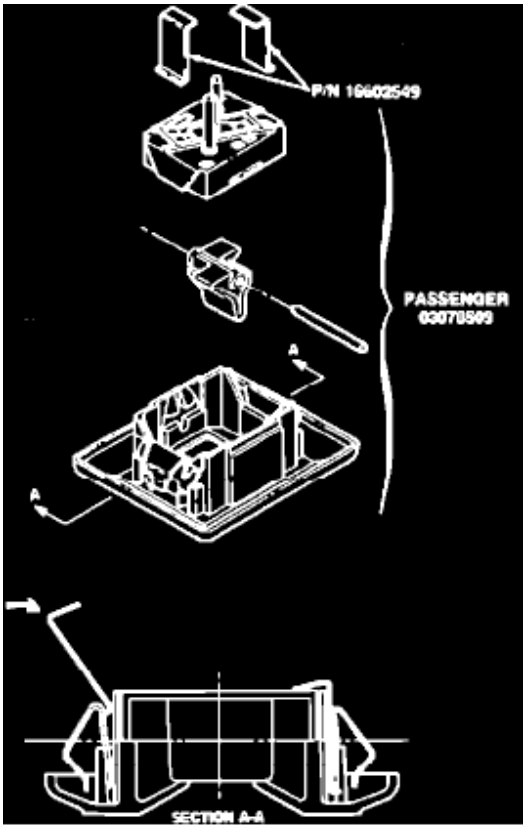
Model and Year: 1985-86 CAPRICE AND MONTE CARLO WITH ELECTRIC DOOR LOCKS
1985-86 EL CAMINO AND C/K/G 10, 20, 30 TRUCKS WITH ELECTRIC DOOR LOCKS

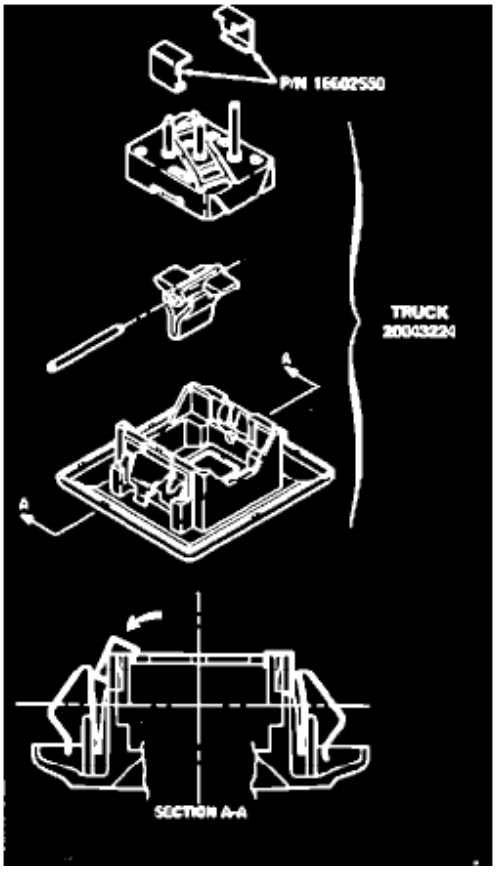
TO: ALL CHEVROLET DEALERS

Some electric door lock switches may become separated while installed in the vehicle. This condition may be reported on either the right, left, or both front doors. Two different type clips have been released to correct this condition.mClips should be added to both door lock switches even if only one is reported as separated.

For Switch, P/N 20209091 Use Clip, P/N 16602550 For Switch, P/N 20043224

For Switch, P/N 3078509 Use Clip, P/N 16602549





To install clips:

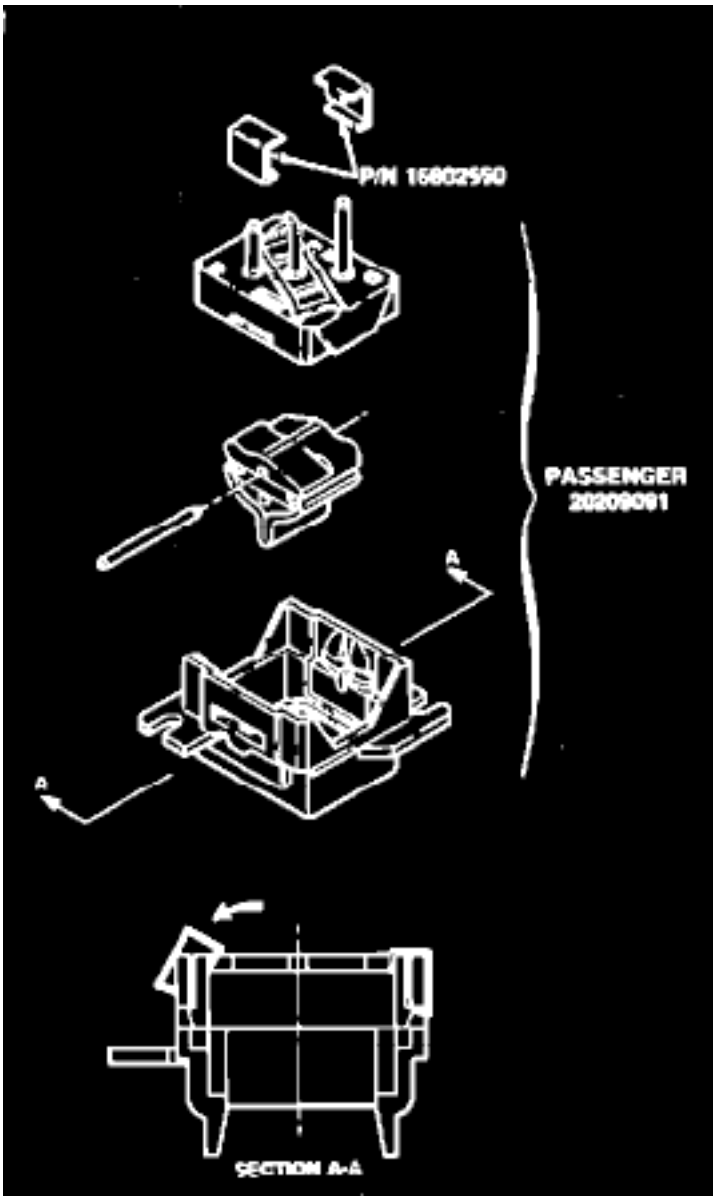
1. Remove switch assembly as described in the body Service Manual.

2. If switch has become separated, inspect for damage, if no damage is found reassemble switch and add two clips as indicated on illustration.

3. If switch is separated and damaged, replace complete switch assembly and add clips as indicated on illustration.

Use applicable Labor Operation Number and Time. NOTE:

Adequate quantities of both clips should be maintained to allow for prompt repair



Power Door Lock Switch: All Technical Service Bulletins Electric Door Lock Switch - Separated While Installed

Number: 86-182

Section: 9

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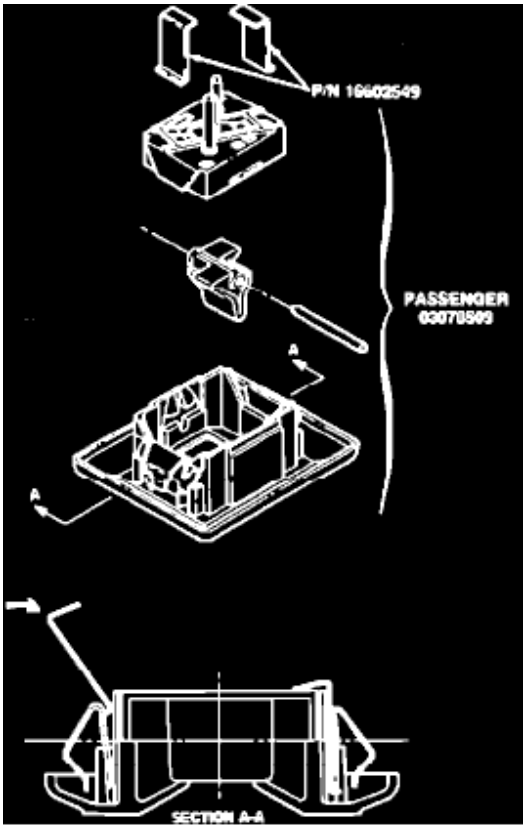

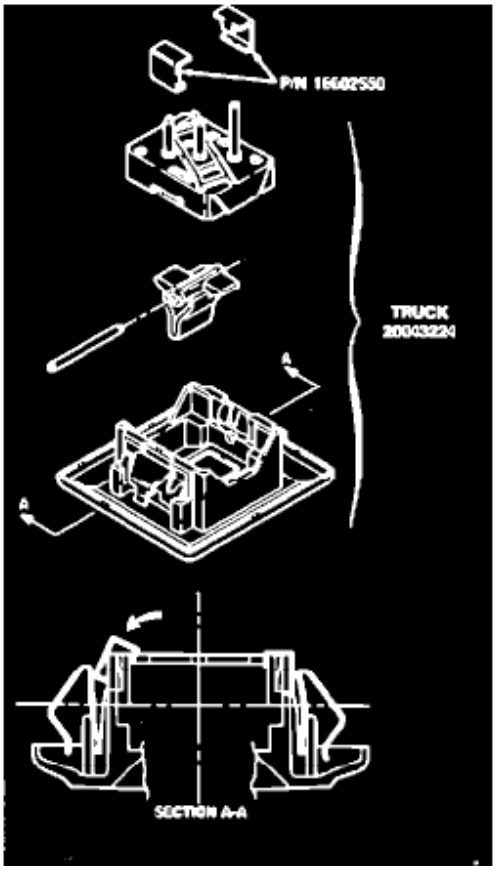

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Use applicable Labor Operation Number and Time. NOTE:

Adequate quantities of both clips should be maintained to allow for prompt repair

Number: 93-29-7A Section: 7A Date: OCT. 1992 Corporate Bulletin No.: 277142 ASE No.: A2

Subject: BUZZING NOISE AT IDLE

Model and Year: 1982-93 CAPRICE, CAMARO AND CORVETTE 1982-93 C/K, R/V, S/T, M/L AND G TRUCKS WTIH 4L60 AUTOMATIC TRANSMISSION

TRANSMISSION APPLICATIONS: 1982-1993 HYDRA-MATIC 4L60 (MD8)

TRANSMISSION MODELS: All

SUBJECT: Pressure Regulator Valve Buzz

VEHICLE APPLICATIONS: B, D, F, Y - Cars C/K, R/V, S/T Trucks G, M, L - Vans

CONDITION:

Some 1982-1993 vehicles equipped with a HYDRA-MATIC 4L60 transmission may have a buzzing noise coming from the transmission when the vehicle is at idle. The buzzing noise may be noticed more when the vehicle is in reverse at idle.

CAUSE:

The buzzing noise may be a result of pressure regulator valve oscillating due to oil pressure instability at lower idle RPM.

CORRECTION:

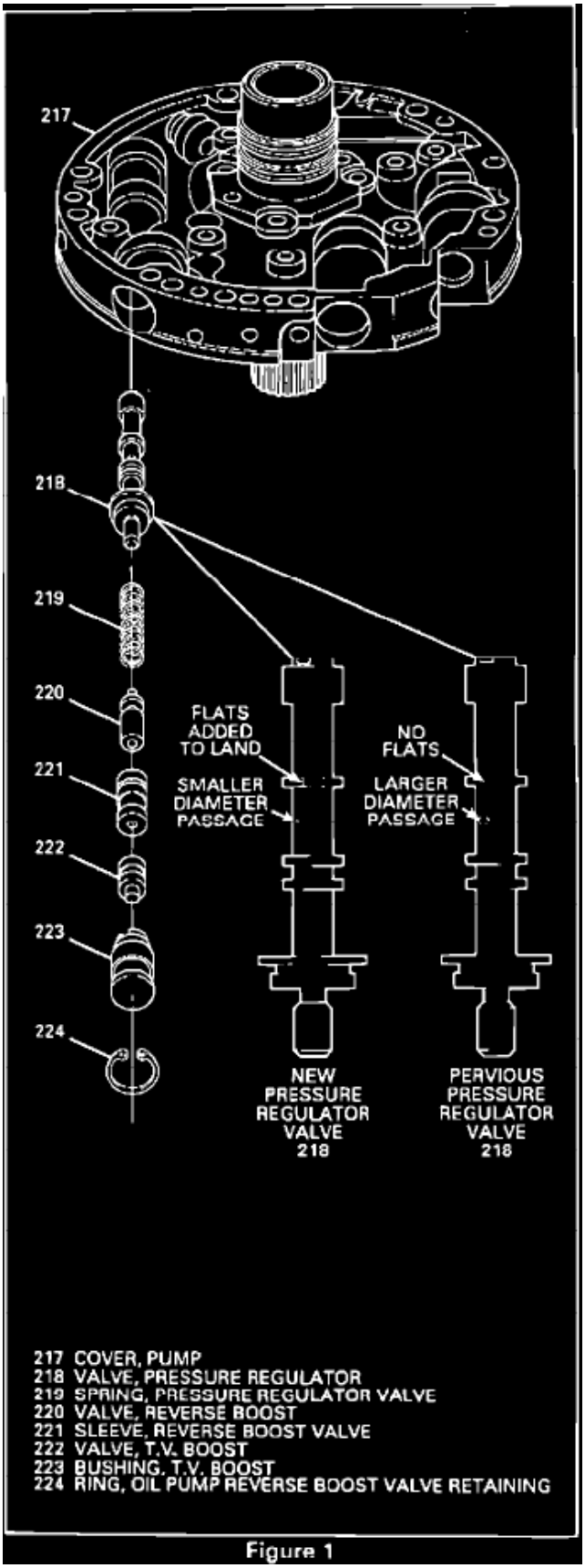


Figure 1

A new pressure regulator valve (III. 218) has been made which will improve the oil pressure stability at lower RPM.

SERVICE PARTS INFORMATION:

Description Part Number

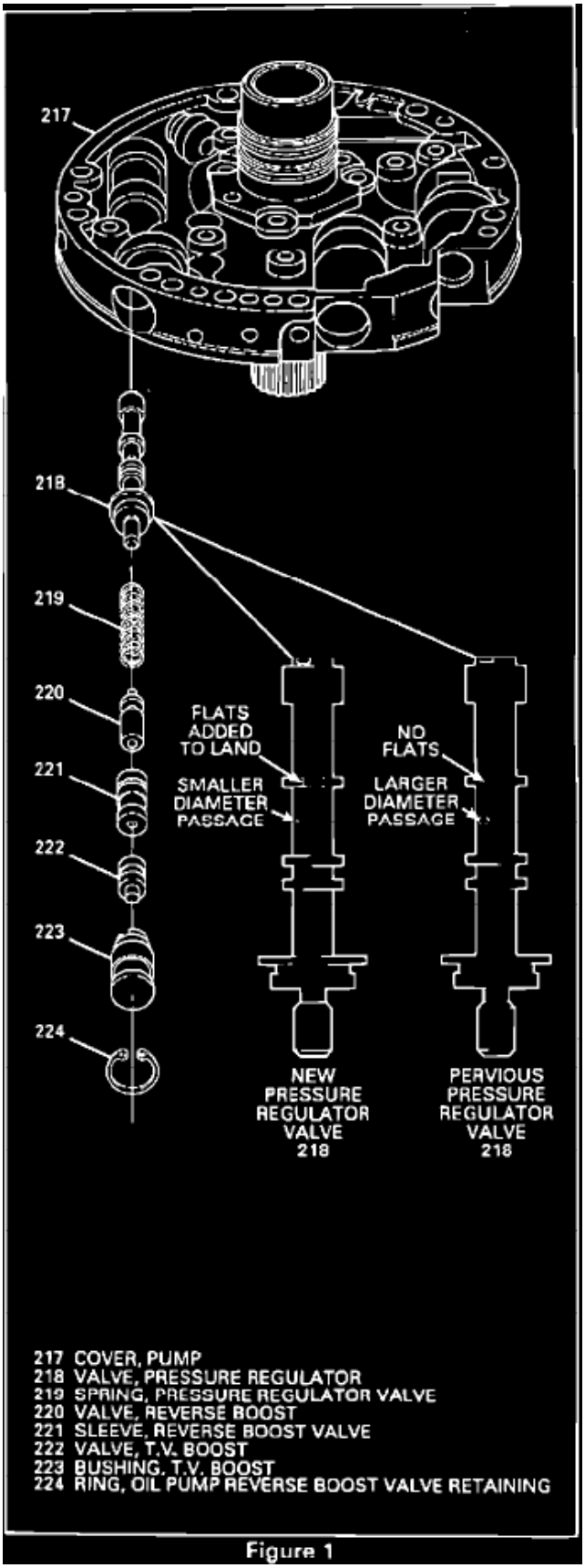
Valve, Pressure Regulator (III. 218) 8684048

Part numbers are for Reference Only. Check with your Parts Department for latest information.

Labor Operation No.: K6550 Valve, Pressure Regulator-R&R; or Replace

Use the appropriate labor time in the labor time guide.

Parts are currently available from GMSPO.



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Parts are currently available from GMSPO.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

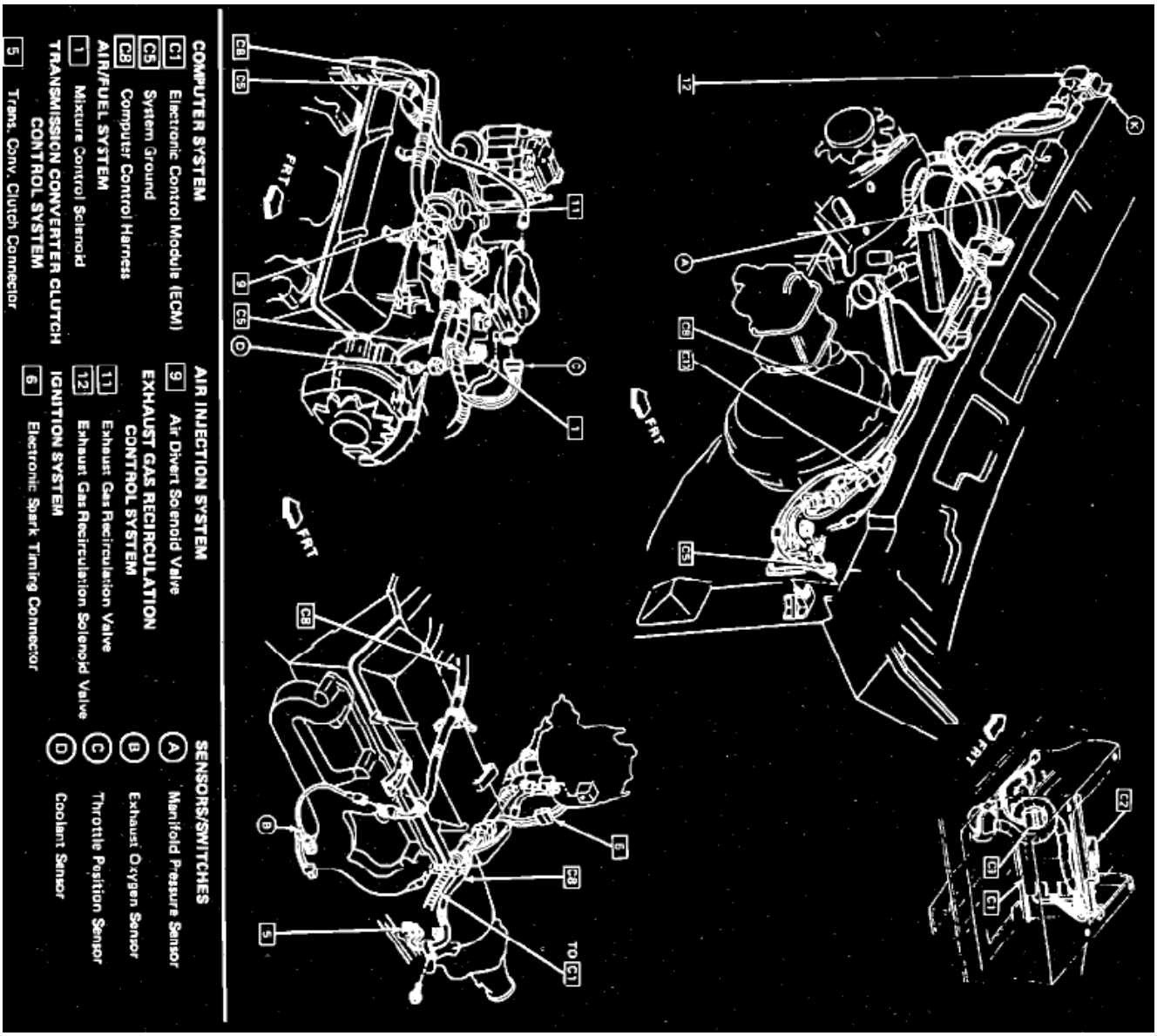
TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

The coolant temperature sensor supplies coolant temperature information to the ECM. It is mounted in the engine coolant stream and has high resistance when the engine is cold and low resistance when the engine is warm. The ECM receives this information and controls the various systems that are dependent on temperature for proper operation.

Coolant Temperature Sensor/Switch (For Computer): Service and Repair

1. Disconnect electrical connector and remove sensor.
2. Reverse procedure to install. Torque sensor to 72 in lbs.

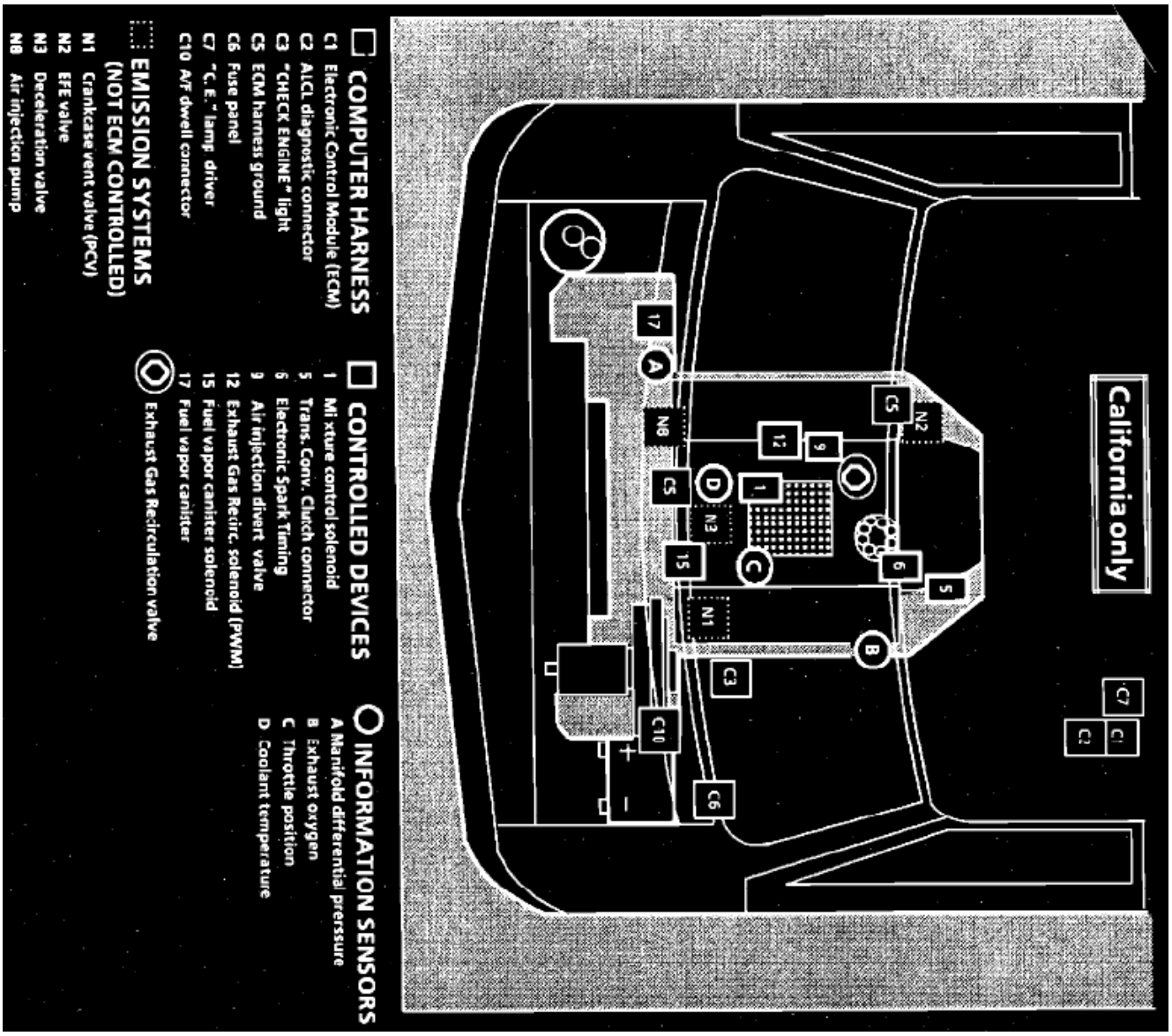


Radiator Cooling Fan Temperature Sensor / Switch: Locations Coolant Sensor

Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/V8

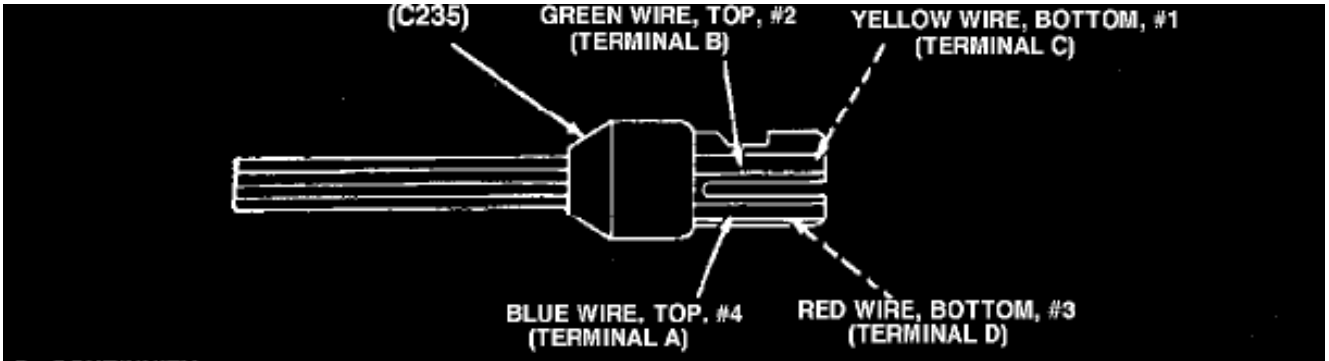


Radiator Cooling Fan Temperature Sensor / Switch: Locations Coolant Temperature Sensor

Underhood & Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



C - CONTINUITY
O - NO CONTINUITY

SET/COAST (S/C) SW	POSITION SLIDER	1-2	1-3	1-4	2-3	2-4	3-4
NORMAL	OFF	O	O	O	O	O	O
NORMAL	ON	O	O	O	O	C	O
NORMAL	R/A	C	O	C	O	C	O
DEPRESSED	OFF	O	O	O	C	O	O
DEPRESSED	ON	O	O	O	C	C	C
DEPRESSED	R/A	C	C	C	C	C	C

Cruise Control Switch: Testing and Inspection Mode Control Assembly

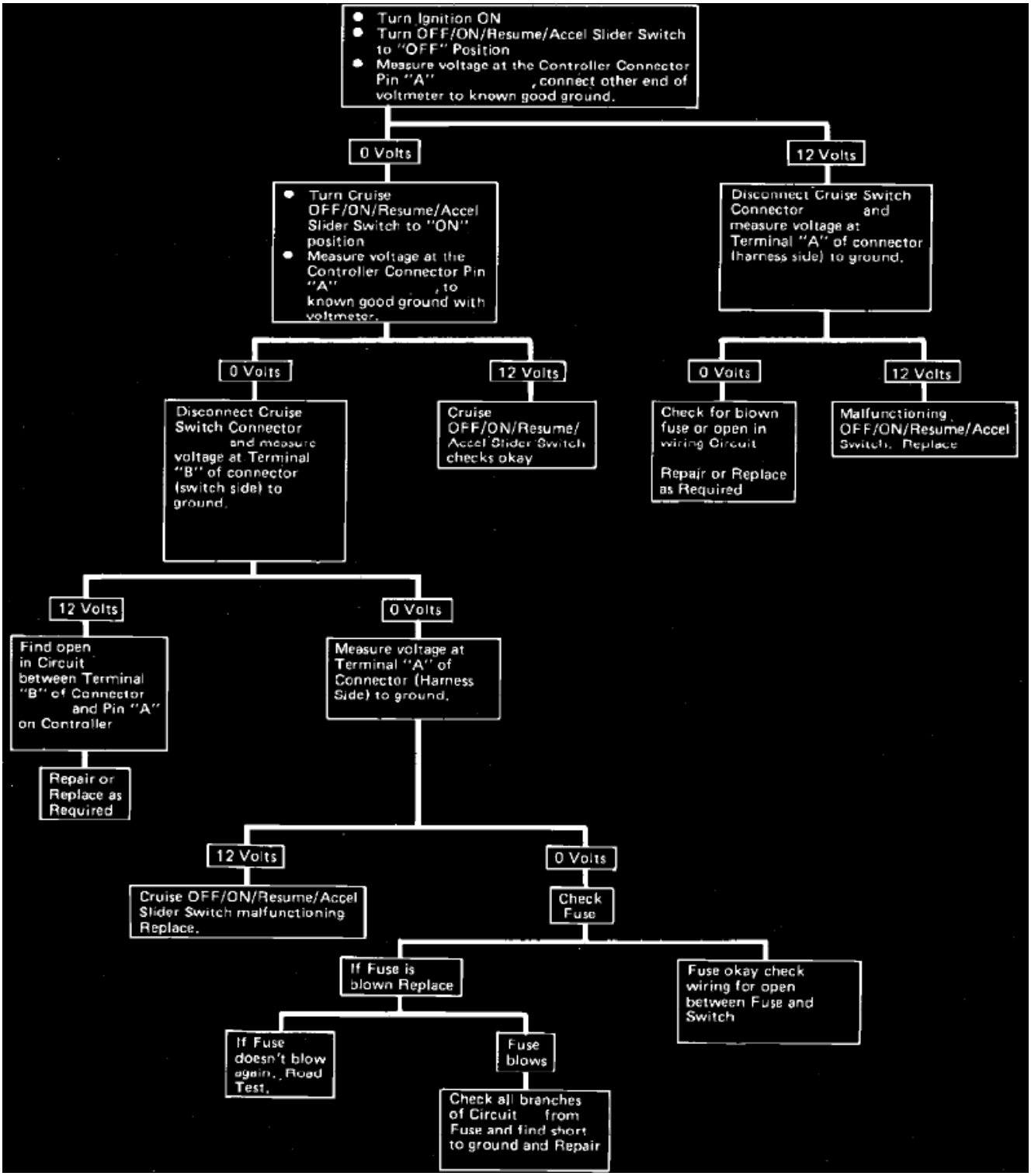
Fig. 18 Mode control continuity test. Custom Cruise III

1. Disconnect mode control electrical connector from main harness connector at base of steering column.

2. Test continuity between switch connector terminals using an ohmmeter.

3. If continuity is not as shown in Fig. 18, switch is defective.

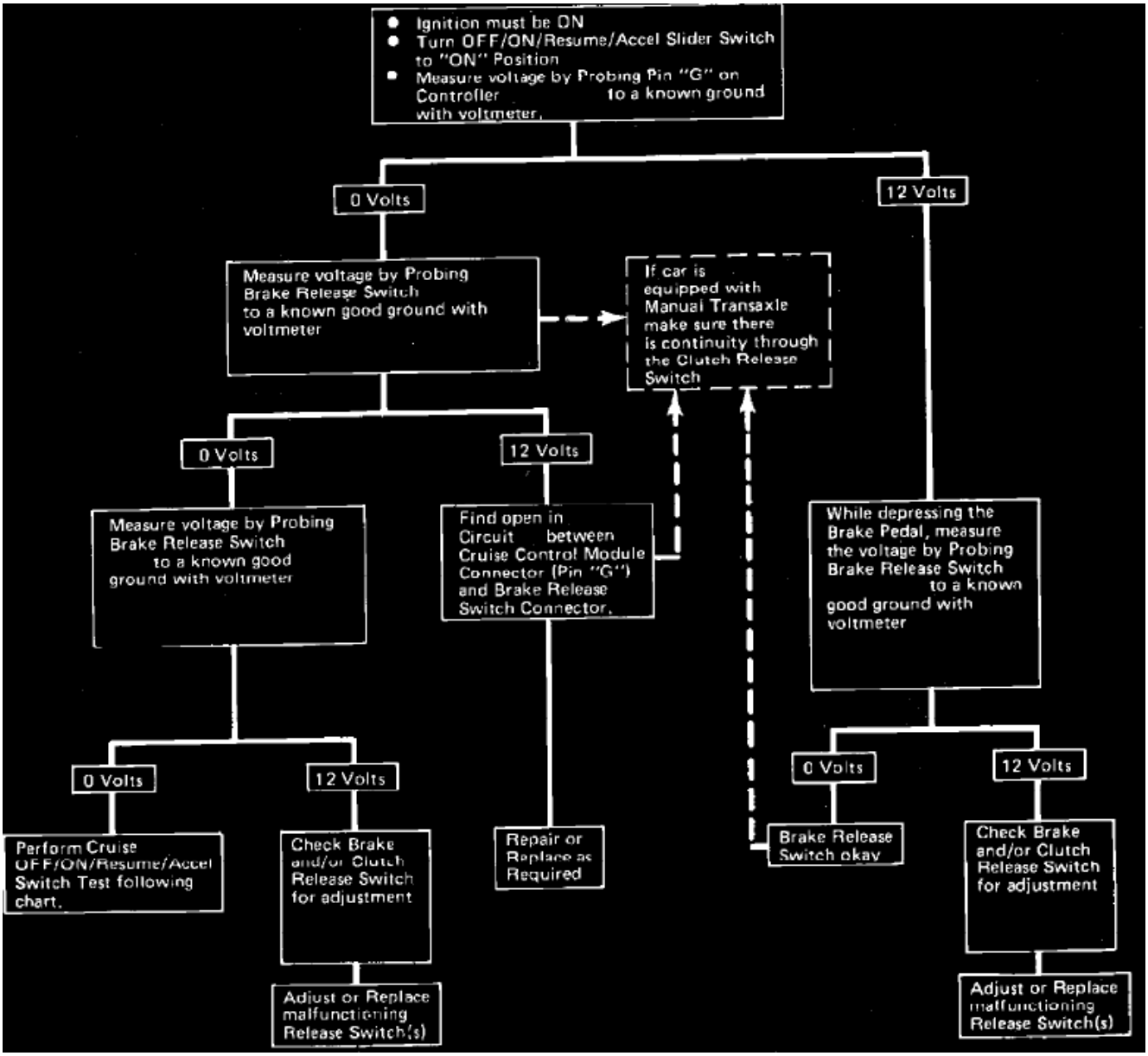
4. Check continuity between each switch connector terminal and ground. If meter indicates continuity, check for pinched switch harness in steering column mast jacket.



Cruise Control Switch: Testing and Inspection Off/On/Resume/Accel Switch Test

Fig. 15 On/Off/Resume/Accel switch diagnostic chart. Custom Cruise III

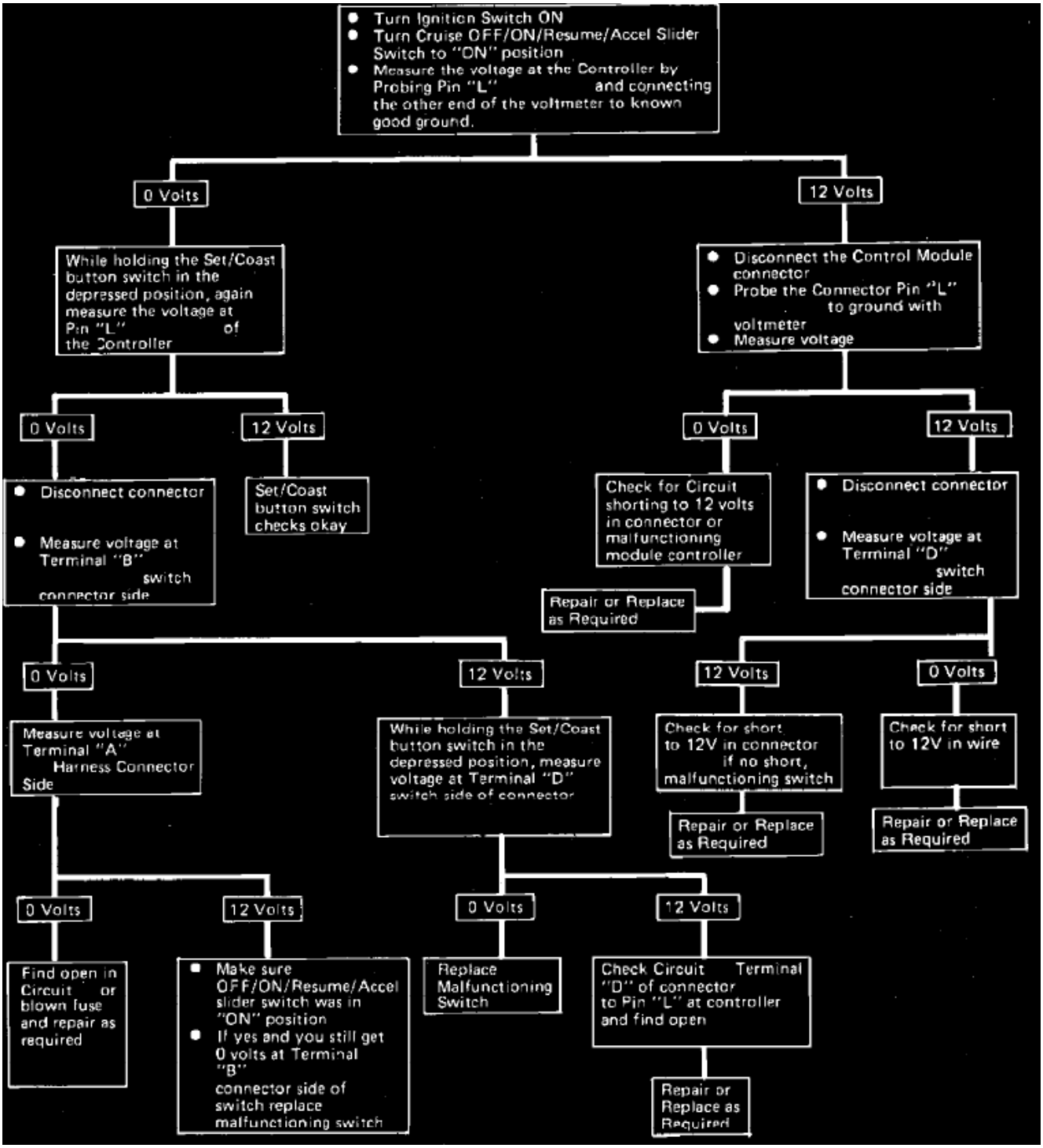
Refer to Fig. 15 to check Off/On/Resume/Accel switch and related wiring.



Cruise Control Switch: Testing and Inspection Release Switch Test

Fig. 16 Release switch diagnostic chart. Custom Cruise III

Refer to Fig. 16 to check cruise release switch and related wiring.



Cruise Control Switch: Testing and Inspection Set/Coast Switch Test

Fig. 14 Set/Coast switch diagnostic chart. Custom Cruise III

Refer to Fig. 14 to check set/coast switch and related wiring.

Oil Pressure Sender: Specifications

Oil Pressure Switch 10 ft.lb

Blower Motor Switch: Service and Repair

G SERIES

1. Disconnect battery ground cable.
2. Remove left foot cooler outlet at instrument panel, if applicable.
3. Disconnect harness leads.
4. Remove switch mounting screws, then switch.
5. Reverse procedure to install.

Dimmer Switch: Technical Service Bulletins IP Dimmer Control - Proper Setting

File In Section: 08 - Body and Accessories

Bulletin No.: 99-08-42-009

Date: November, 1999

INFORMATION

Subject: Proper Setting of I/P Dimmer Control to View PRNDL Display with Automatic Headlamp Control

Models: 2000 and Prior All Passenger Cars and Trucks With Automatic Headlamp Control and Electronic PRNDL Display

Under certain conditions, if the instrument panel dimmer control is turned relatively low, the PRNDL will not be visible until the automatic headlamp control turns the headlamps off and the daytime running lamps (DRL) are turned back on. Such a condition may be if the vehicle is first started in an environment where the headlamp control turns on the headlamps and then the vehicle is driven out into a brighter environment (for example, when a vehicle is backed out of a dark garage into the bright sunlight).

This condition is normal and any repair attempt will not be successful. Demonstrate this condition to the customer using the service lane and then turn the instrument panel dimmer control to a higher setting. This will enable the driver to see the PRNDL display

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Lighting and Horns > Backup Lamp Switch > Component Information > Technical Service Bulletins > Customer Interest for Backup Lamp Switch: > 914598A > Dec > 91 > Backup Lamps/Tailgate Window Release - Inoperative

Backup Lamp Switch: Customer Interest Backup Lamps/Tailgate Window Release - Inoperative

Number: 91-459-8A

Section: 8A

Date: DEC. 1991

Corporate Bulletin No.: 168104

ASE No.: A6

Subject: BACKUP LAMPS OR TAILGATE WINDOW RELEASE INOPERATIVE

Model and Year: 1980-91 ALL LIGHT DUTY TRUCKS (EXCEPT GEO)

Owners of some 1980-1991 C/K, 1982-1991 G, 1985-1991 M/L, 1984-1991 P2,P3, 1987-1991 R/V, 1983- 1991 ST (including LLV) with automatic transmissions may comment on a condition of inoperative back-up lamps or inoperative tailgate window release. This condition occurs when the vehicle's gear shift lever is placed in the "reverse" position, but the back-up lamps do not illuminate. In addition, on the S/T utility vehicles, the electric tailgate window release does not release when the transmission gear shift lever is placed in the "park" or "neutral" position and the endgate window release button is depressed. The park/neutral and back-up lamp switch comes out of adjustment which does not allow for the contact points to remain engaged.

To correct these conditions, the contact carrier on the park/neutral and back-up lamp switch has been modified to increase switch carrier travel.

SERVICE PROCEDURE:

1. Disconnect the battery ground cable from the battery.

2. Disconnect the switch assembly harness.

3. Place the gear selector in neutral.

4. Squeeze the tangs on the switch together and remove the switch assembly.

5. Install the new switch assembly (P/N 15679680) by:

-aligning the actuator with the cutout in the steering column jacket. -inserting the tangs into the rectangular holes and pushing

down on the switch assembly.

6. Adjust the switch by moving the gear selector to park.

7. Connect the switch assembly harness.

8. Connect the negative battery cable.

9. Check for proper switch operation. Readjust the switch as necessary.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Lighting and Horns > Backup Lamp Switch > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Backup Lamp Switch: > 914598A > Dec > 91 > Backup Lamps/Tailgate Window Release - Inoperative

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6. Adjust the switch by moving the gear selector to park.

7. Connect the switch assembly harness.

8. Connect the negative battery cable.

9. Check for proper switch operation. Readjust the switch as necessary.

Backup Lamp Switch: Service and Repair

MANUAL TRANSMISSION MODELS

Column Mounted Type

1. Disconnect battery ground cable. 2. Disconnect switch wiring harness. 3. Remove switch retaining screws and switch. 4. Assemble new switch onto column, then install retaining screws. 5. Reconnect battery ground cable, then check switch for proper operation.

Transmission Mounted Type

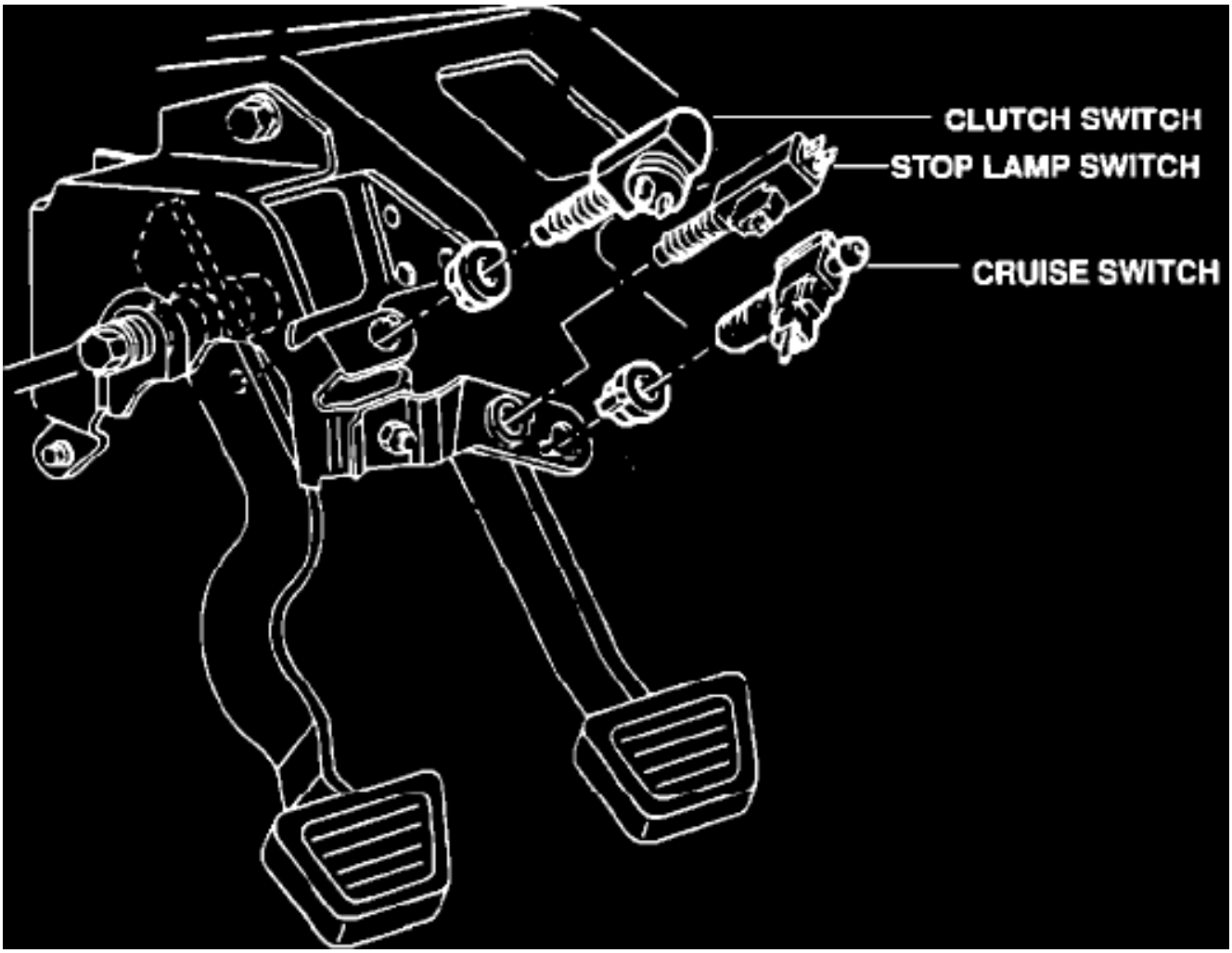
1. Disconnect battery ground cable. 2. Raise and support vehicle. 3. Disconnect switch wiring harness, then remove switch from transmission. 4. Reverse procedure to install, then check switch for proper operation.

Models With Neutral Start/Mechanical Lockout

1. Disconnect battery ground cable. 2. Disconnect wiring harness connectors at switch. 3. Remove switch retaining screws and switch from mast jacket. 4. Place gear selector in neutral, then align actuator on new switch with hole in shift tube. 5. Position connector side of switch into cutout in lower jacket, then push down on front of switch until tangs snap into holes in jacket. Install

retaining screws.

6. Reconnect wiring harness connectors, then place shift lever in Park. 7. Reconnect battery ground cable, then check switch for proper operation.



Brake Light Switch: Customer Interest Brakes - Light Brake Drag While Driving

Number: 89-262-5

Section: 5

Date: September 1989

Corporate Bulletin No.: 915002 Subject:

LIGHT BRAKE DRAG - BRAKE SWITCH ADJUSTMENT

Model and Year: 1980-89 A, B, F, G, J, L, X, Y 1980-89 ALL TRUCKS

Figure 1

TO: ALL CHEVROLET DEALERS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 89-178-5, DATED JUNE 1989, IN ORDER THAT WE MAY CORRECTLY IDENTIFY THE SWITCH

REQUIRING ADJUSTMENT. ALL COPIES OF 89-178-5 SHOULD BE DISCARDED.

Some vehicles may experience a condition of light brake drag while driving. These conditions have been found to be more noticeable on vehicles which have an anti-lock brake system.

This may be caused by improper brake switch adjustment. If the brake switch is not adjusted properly, the switch may push on the brake pedal and cause the brake to remain partially applied.

If a vehicle exhibits any of the above conditions, perform the following functional brake switch adjustment check:

Passenger Cars Only:

The following steps should be used to check brake switch adjustment:

1. Remove the driver-side hush panel (refer to Figure 1).

2. Gently pull back on the brake pedal until no audible clicks are heard. The switch will be moved in the tubular retainer providing adjustment.

3. Replace the hush panel.

4. Verify that the brake drag condition is no longer present and that the cruise control and brake lights function properly.

If the functional brake switch adjustment check does not repair the condition, refer to Section 5 of the appropriate Service Information Manual for aid in diagnosing other causes.

For warranty purposes use:

Labor Operation Number: N2440

Labor Time: .3 hour

TRUCK ONLY:

Service Procedure:

1. Depress the brake pedal and press the switch in until it is firmly seated in the clip.

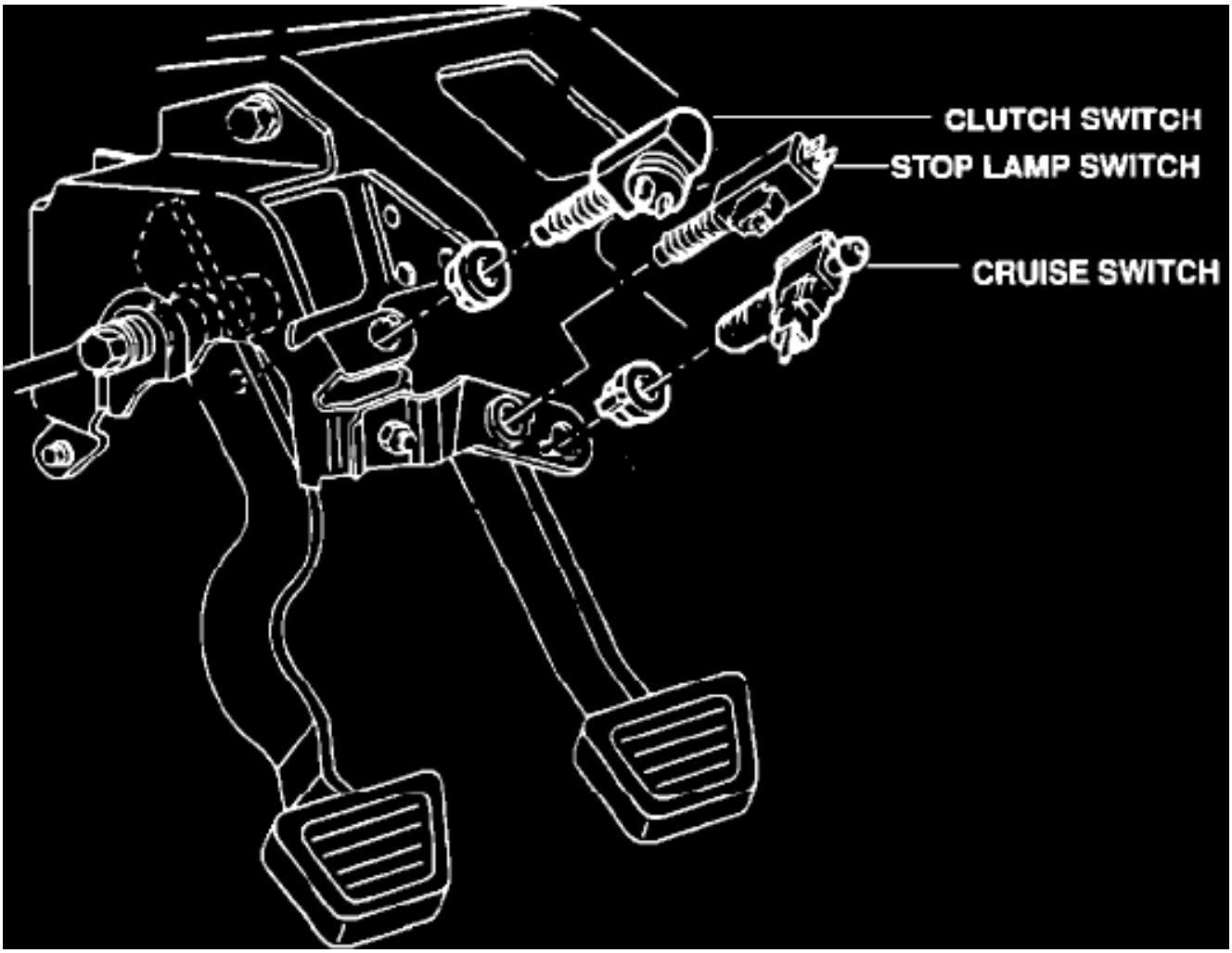
* Audible "clicks" can be heard as the threaded portion of the switch is pushed through the clip.

2. Pull the brake pedal against the pedal stop until the audible "click" can no longer be heard.

For stop lamp switch adjustments on vehicles repaired under warranty use:

Labor Operation Number: T7945

Labor Time: .2 Hr.



Brake Light Switch: All Technical Service Bulletins Brakes - Light Brake Drag While Driving

Number: 89-262-5

Section: 5

Date: September 1989

Corporate Bulletin No.: 915002 Subject:

LIGHT BRAKE DRAG - BRAKE SWITCH ADJUSTMENT

Model and Year: 1980-89 A, B, F, G, J, L, X, Y 1980-89 ALL TRUCKS

Figure 1

TO: ALL CHEVROLET DEALERS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 89-178-5, DATED JUNE 1989, IN ORDER THAT WE MAY CORRECTLY IDENTIFY THE SWITCH

REQUIRING ADJUSTMENT. ALL COPIES OF 89-178-5 SHOULD BE DISCARDED.

Some vehicles may experience a condition of light brake drag while driving. These conditions have been found to be more noticeable on vehicles which have an anti-lock brake system.

This may be caused by improper brake switch adjustment. If the brake switch is not adjusted properly, the switch may push on the brake pedal and cause the brake to remain partially applied.

If a vehicle exhibits any of the above conditions, perform the following functional brake switch adjustment check:

Passenger Cars Only:

The following steps should be used to check brake switch adjustment:

1. Remove the driver-side hush panel (refer to Figure 1).

2. Gently pull back on the brake pedal until no audible clicks are heard. The switch will be moved in the tubular retainer providing adjustment.

3. Replace the hush panel.

4. Verify that the brake drag condition is no longer present and that the cruise control and brake lights function properly.

If the functional brake switch adjustment check does not repair the condition, refer to Section 5 of the appropriate Service Information Manual for aid in diagnosing other causes.

For warranty purposes use:

Labor Operation Number: N2440

Labor Time: .3 hour

TRUCK ONLY:

Service Procedure:

1. Depress the brake pedal and press the switch in until it is firmly seated in the clip.

* Audible "clicks" can be heard as the threaded portion of the switch is pushed through the clip.

2. Pull the brake pedal against the pedal stop until the audible "click" can no longer be heard.

For stop lamp switch adjustments on vehicles repaired under warranty use:

Labor Operation Number: T7945

Labor Time: .2 Hr.

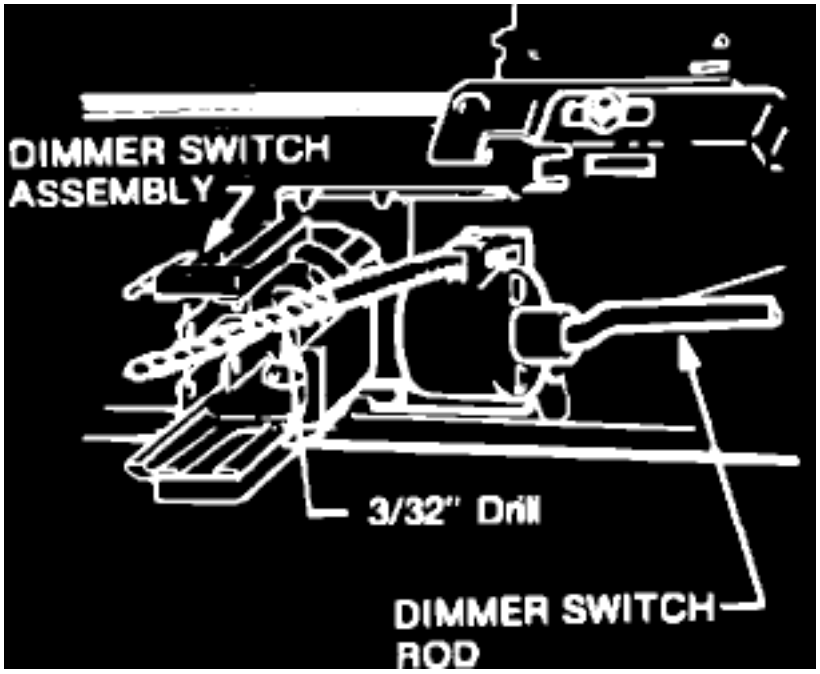
Brake Light Switch: Service and Repair

1. Disconnect wiring connector at switch.

2. Remove retaining nut, if equipped, then unscrew switch from mounting bracket.

3. To install, depress brake pedal and push new switch into clip until shoulder bottoms out.

4. Plug connector onto switch and check operation. Electrical contact should be made when pedal is depressed .500 inch (Caballero and El Camino), .700 inch (G and P models) or 1.125 inch (C, K, R and V models) from its fully released position.



Headlamp Dimmer Switch: Service and Repair Column Mounted Dimmer Switch

Fig. 11 Column mounted dimmer switch installation

1. Disconnect battery ground cable.

2. Remove instrument panel lower trim and on models with A/C, remove A/C duct extension at column.

3. Disconnect shift indicator from column and remove toe-plate cover screws.

4. Remove two nuts from instrument panel support bracket studs and lower steering column, resting steering wheel on front seat.

5. Remove dimmer switch retaining screws and the switch. Tape actuator rod to column and separate switch from rod.

6. Reverse procedure to install. To adjust switch, depress dimmer switch slightly and install a 3/32 inch twist drill to lock the switch to the body, Fig. 11. Force switch upward to remove lash between switch and pivot. Torque switch retaining screw to 35 inch lbs. and remove tape from actuator rod. Remove twist drill and check for proper operation.

Headlamp Dimmer Switch: Service and Repair Floor Mounted Dimmer Switch

1. Disconnect battery ground cable.
2. Fold back carpeting in area of switch, then disconnect electrical connector from switch.
3. Remove switch retaining screws and the switch.
4. Reverse procedure to install.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Lighting and Horns > Headlamp Switch > Component Information > Technical Service Bulletins > Recalls for Headlamp Switch: > 86C05A > Sep > 86 > Recall - Push-Pull Headlight Switch Replacement

Recall - Push-Pull Headlight Switch Replacement

Number: REISSUE 86C05(a)

Section: 8B

Date: September, 1986

Subject: PRODUCT SAFETY CAMPAIGN 86CO5(a) PUSH-PULL HEADLIGHT SWITCH REPLACEMENT

Model and Year: 1986 CHEVROLET PASSENGER CARS, MEDIUM DUTY TRUCKS AND 1985-1986 LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

THIS BULLETIN IS BEING REISSUED TO SUPERSEDE PRODUCT CAMPAIGN BULLETIN 86C05 DATED MAY, 1986. UPON RECEIPT OF THE REISSUED BULLETIN 86CO5(a) DESTROY 86CO5.

The National Traffic and Motor Vehicle Safety Act, as amended, provides that each vehicle which is subject to a recall campaign of this type must be adequately repaired within a reasonable time after the owner has tendered it for repair. A failure to adequately repair within 60 days after tender of a vehicle is prima facie evidence of failure to repair within a reasonable time.

If the condition is not adequately repaired within a reasonable time, the owners may be entitled to an identical or reasonably equivalent vehicle at no charge or to a refund of the purchase price less a reasonable allowance for depreciation.

To avoid having to provide these burdensome solutions, every effort must be made to promptly schedule an appointment with each owner and to repair their vehicle as soon as possible. As you will see in reading the attached copy of the letter which is being sent to owners, the owners are being instructed to contact the nearest Chevrolet Zone Office if their dealer does not remedy the condition within five days of the mutually agreed upon service date. If the condition is not remedied within a reasonable time, they are instructed on how to contact the National Highway Traffic Safety Administration.

CONDITION

General Motors has determined that a defect which relates to motor vehicle safety exists in some 1986 Chevrolet Passenger Cars Medium Duty Trucks and 1985-1986 Light Duty Trucks. The push-pull headlight switch might have been manufactured with electrical contacts which could potentially result in an intermittent headlight circuit. An intermittent circuit could cause the headlights to suddenly go out. Sudden loss of the headlights under severe weather or nighttime driving conditions could reduce driver visibility which might result in a vehicle crash without prior warning.

DEALER ACTION

To prevent this condition dealers are required to inspect, and if necessary, replace push-pull headlight switches on suspect vehicles per the Vehicles Involved and Service Procedure sections of this bulletin.

Vehicles Involved

Certain 1986 Chevrolet Passenger Cars, Medium Duty and 1985-1986 Light Duty Trucks within the following parameters:

YEAR PLANT FROM THROUGH

"S/T" LIGHT DUTY TRUCKS

1985 Pontiac F0213991 F0217303

1985 Moraine F2261445 F2266283

"P" FWD. CONTROL TRUCKS

1985 Detroit F3345668 F3346279

1986 Detroit G3315972 G3317552

CELEBRITY

1986 Oklahoma City G6117716 G6121696

G6222460 G6230910

1986 Oshawa G1126879 G1127808

G1227276 G1237184

1986 Framingham GG104644 GG104779

GG131917 GG135586

CAMARO

1986 Van Nuys GL108269 GL111008

GL169838 GL171816

Norwood GN112086 GN115431

GN149765 GN165774

MONTE CARLO

1986 Arlington GR112552 GR116439

GR174982 GR179215

CAVALIER (EXCEPT JE & JF SERIES)

1986 Leeds GK110420 GK112653

GK145880 GK148445

1986 Lordstown G7119205 G7124854

G7204309 G7208597

1986 Janesville GJ119727 GJ130584

GJ212326 GJ239084

# Denotes Change YEAR

PLANT FROM THROUGH

CHEVETTE

1986 Lakewood GA115292 GA117670

GA175188 GA178124

CORVETTE

1986 Bowling Green G5108246 G5108469

MEDIUM DUTY (CONVENTIONAL)

1986 Pontiac GV102035 GV107076

MEDIUM DUTY (P6T042)

1986 Pontiac GV106812 GV106880

MEDIUM DUTY (B6P042 SCHOOL BUS)

1986 Pontiac GV106353 GV107074

"C/K" LIGHT DUTY TRUCKS

1986 Janesville GJ113536

GJ115892

GJ155888

GJ159088

1986 St. Louis GS114175

GS116322

GS163672

GS168176

1986 Oshava #2 G1115519

G1117574

G1177130

G1183207

1986 Flint #1 GF318360

GF319976

GF388768

GF393843

1986 Flint #2 GF113688 GF114911

GF167051 GF170532

"G" VAN

1986 Lordstown G7103939 G7105085

G7163429 G7166183

1986 Scarborough G4110625 G4113044

G4148711 G4151868

Involved vehicles have been identified by Vehicle Identification Number Computer Listings. Computer listings contain the complete Vehicle Identification Number, owner name and address data, and are furnished to the involved dealers with the campaign bulletin. Owner name and address data furnished will enable dealers to follow-up with owners involved in this campaign.

# Denotes Change

These listings may contain owner names and addresses obtained from State Motor Vehicle Registration Records. The use of such motor vehicle registration data for any other purpose is a violation of law in several states. Accordingly, you are urged to limit the use of this listing to the follow-up necessary to complete this campaign. Any dealer not receiving a computer listing with the campaign bulletin has no vehicles currently assigned.

OWNER NOTIFICATION

Owners will be notified of this campaign on their vehicles by Chevrolet Motor Division (see copy of Owner Letter included with this bulletin).

DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time forward.

Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future, you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle.

Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin.

Parts Information

The following push-pull headlight switches will be required, if inspection indicates replacement is necessary.

Parts required to complete this modification are to be obtained from General Motors Warehousing and Distribution Division (GMWDD). To ensure that these parts will be obtained as soon as possible they should be ordered from GMWDD on a C.I.O. order with no special instruction code, but on an advise code (2).

MODEL PART NUMBER QUANTITY

Celebrity, Monte Carlo, 1995217 1 Per Vehicle

Cavalier, Chevette & "S/T" Trucks

Camaro 1995226 1 Per Vehicle

Corvette 1995257 1 Per Vehicle

MODEL PART NUMBER QUANTITY

"C/K" Light Duty 1995216 1 Per Vehicle

Trucks, "G" Vans and "P" Fwd Control

Medium Duty 1995194 1 Per Vehicle

Conventional, P6T042 & School Bus

Service Procedure

NOTE: EACH SUSPECT PUSH-PULL HEADLIGHT SWITCH MUST BE INSPECTED. THERE ARE TWO DIFFERENT INSPECTION PROCEDURES DEPENDING ON SUSPECT DATE PERIOD OF SWITCH. ONE REQUIRES INSPECTION OF A "DATE CODE"; THE OTHER A

"CAVITY CODE." IF THE SWITCH IS NOT WITHIN THE SUSPECT DATE CODES, OR CAVITY CODES, IT NEED NOT BE REPLACED. SEE INSPECTION PROCEDURE.

I.Headlamp Switch Removal

I. Headlamp Switch Removal. Refer to appropriate passenger car or truck Service Manual.

^ 1985 S/T Light Duty Truck - "1985 S-10 Light Duty Truck Shop Manual" (ST-369-85) page 8B-16.

^ 1985 "P" Fwd Control - "1985 10-30 Series Light Duty Truck Shop Manual" (ST-330-85) page 8B-16. Follow the procedure for "G" Series Trucks.

^ 1986 Monte Carlo - "1986 Caprice, Monte Carlo, El Camino Service Manual" (ST-384-86) page 8B-18.

^ 1986 Camaro - "1986 Camaro Service Manual" (ST-386-86) page 8B-17.

^ 1986 Cavalier - "1986 Cavalier Shop Manual" (ST-366-86) page 8C-2.

^ 1986 Celebrity - "1986 Celebrity Shop Manual" (ST-365-86) page 8C-3.

^ 1986 Chevette - "1986 Chevette Shop Manual" (ST-357-86) page 8B-16

^ 1986 "C, K, G" Light Duty Trucks - "1986 10-30 Series Light

Duty Truck Shop Manual" (ST-330-86) page 8B-24. 1986 "P" Fwd. Control Follow the procedure for "G" series trucks.

^ 1986 Medium Duty Trucks - "1986 Medium Duty Trucks Service Manual" (ST-31-84) page 8C-4.

# Denotes Change

^ 1986 Corvette - The 1986 Corvette Shop Manual provides very limited information on headlamp switch replacement. We have, therefore, provided a removal procedure that can be used.

a) Disconnect battery ground cable.

b) Remove light switch knob (spring loaded) and steering wheel tilt lever.

c) Remove cluster bezel from I.P.

d) Remove light switch nut.

e) Remove fuse panel cover and I.P. right side trim plate.

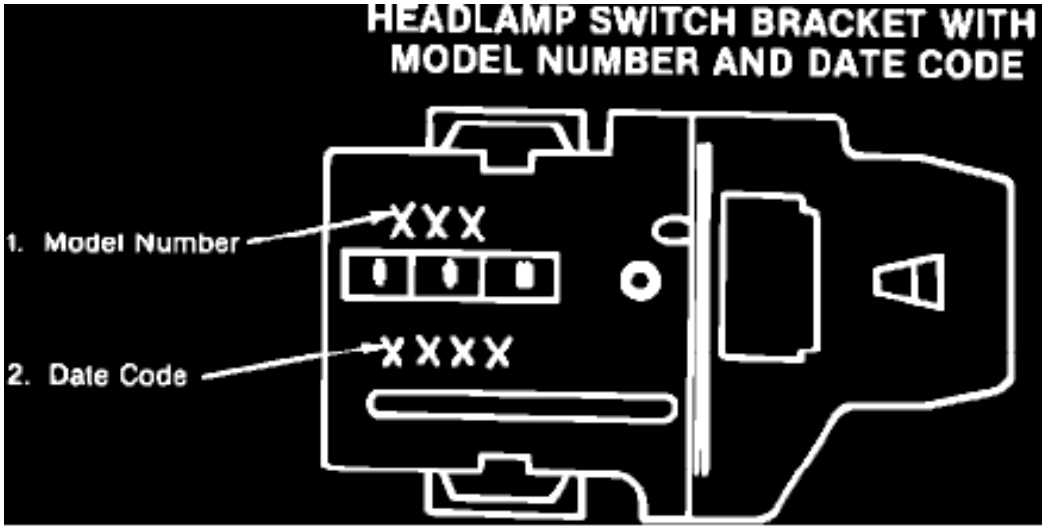
f) Remove I.P. pad.

g) Disconnect electrical connector from headlamp switch.

h) Refer to Section II for inspection and reinstallation procedure.

VEHICLES IDENTIFIED BY A (#) SIGN IN THE "VEHICLES INVOLVED" SECTION SHOULD REFER TO SECTION III FOR "CAVITY CODE" INSPECTION/ REINSTALLATION INSTRUCTIONS. ALL OTHER VEHICLES USE THE "DATE CODE" INSPECTION/REINSTALLATION INSTRUCTIONS IN SECTION II.

II."Date Code" Inspection Procedure and Reinstallation of Headlamp


HEADLAMP SWITCH BRACKET WITH
MODEL NUMBER AND DATE CODE
1. Model Number
XXX
2. Date Code
XXXX

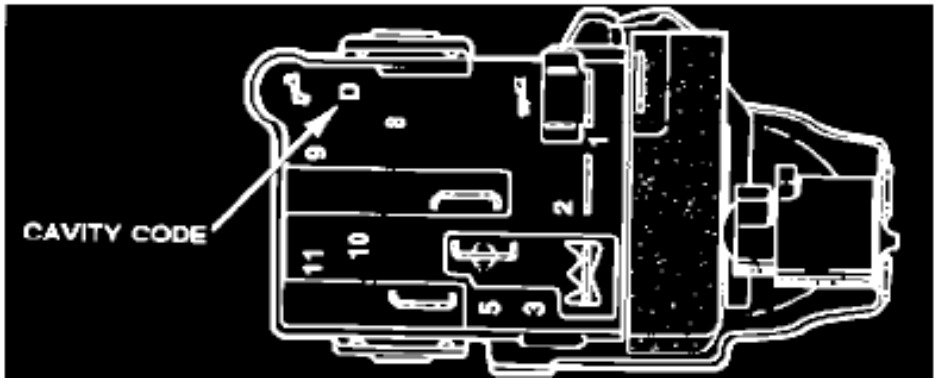

CAVITY CODE
9
8
1
2
11
10
5
3

FIGURE 1

1. After removing the Headlight Switch from the Instrument Panel, refer to Figure 1 to locate and identify the date code.

2. The four digit date code will appear the same on any switch regardless of the model usage or part number.

3. If the date code is 0015 or between the range 9235 through 9305, replace the switch using the correct part number per the Parts Information section.

If the switch is not within the suspect date codes, reconnect the existing switch. Proceed to step 4.

4. Reassemble the Headlight Switch and I/P Trimplate per the applicable Service Information Manual instructions.

5. Install the Campaign Identification Label.

# Denotes Change

III. Cavity Code Inspection Proc. & Reinstallation of Headlamp Switch

FIGURE 2 - LOCATION OF CAVITY CODE ON INSTRUMENT PANEL

1. After removing the headlight switch from the Instrument Panel I.P.), refer to Figure 2 to locate and identify the cavity code.

2. The alphabetical cavity code will appear in the same area on any switch regardless of the model usage or part number.

3. If the cavity code is a "D" or "M", replace the switch using the correct part number per the Parts Information section.

If the switch does not have the suspect alphabetical cavity codes, reconnect the existing switch. Proceed to step 4.

4. Reassemble the headlight switch and I.P. trimplate per the applicable Service Information Manual instructions.

5. Install the Campaign Identification Label.

CAMPAIGN IDENTIFICATION LABEL

CAMPAIGN IDENTIFICATION LABEL

Each vehicle modified in accordance with the instructions outlined in this Product Campaign Bulletin will require a "Campaign Identification Label." Each label provides a space to include the five digit dealer code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen. Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner.

Apply "Campaign Identification Label" only on a clean dry surface.

Claim Information

Submit a Product Campaign Claim with the information indicated below:

	REPAIR PERFORMED	PC	FAILED PART NO.	* PARTS ALLOW	FC	LABOR OP	LAB HRS	* OTH HRS
#	• INSPECT HEADLIGHT SWITCH 1986 CHEVETTE, "C", "K" & M.D. TRUCK				00	V3260	.3	.1
#	• INSPECT HEADLIGHT SWTICH 1986 MONTE CARLO, "G" VAN & 1985-86 "P" FWD CONTROL MODELS				0	V3262	.4	.1
	• INSPECT HEADLIGHT SWITCH 1986 CELEBRITY & CAVALIER MODELS				00	V3266	.5	.1
	• INSPECT HEADLIGHT SWITCH 1986 CAMARO MODELS				0	V3267	.6	.1
	• INSPECT HEADLIGHT SWITCH 1986 CORVETTE MODELS				00	V3268	.7	.1
#	• INSPECT HEADLIGHT SWITCH 1985 "S/T" TRUCK MODELS				00	V3269	.9	.1
#	• INSPECT AND REPLACE HEADLIGHT SWITCH 1986 CHEVETTE, "C", "K" & M.D. TRUCK		1995217 1995216 1995194	**	00	V3350	.3	.1
#	• INSPECT AND REPLACE HEADLIGMT SWITCH 1986 MONTE CARLO "G" VAN & 1985-86 "P" FWD CONTROL MODELS		1995217 1995216	**	00	V3351	.4	.1
	• INSPECT AND REPLACE HEADLIGHT SWITCH 1986 CELEBRITY & CAVALIER MODELS		1995217	**	00	V3352	.5	.1
	• INSPECT AND REPLACE HEADLIGHT SWITCH 1986 CAMARO MODELS		1995226	**	00	V3353	.6	.1
	• INSPECT AND REPLACE HEADLIGHT SWITCH 1986 CORVETTE MODELS		1995257	**	00	V3354	.7	.1
#	• INSPECT AND REPLACE HEADLIGHT SWITCH 1985 "S/T" TRUCK MODELS		1995217	**	00	V3355	.9	.1

*Campaign Administrative Allowance.

**The Parts Allowance should be the sum total of the current GMWDD Dealer Net plus 30% of all parts required for the repair.

Dealers will automatically receive the correct labor allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

# DENOTES CHANGE

(Notification Used By Chevrolet Motor Division)

Dear Chevrolet Owner:

This notice is sent to you in accordance with the requirements of the National Traffic and Motor Vehicle Safety Act.

General Motors has determined that a defect which relates to motor vehicle safety exists in some 1986 Chevrolet Passenger Cars and Medium Duty Trucks and 1985-1986 Light Duty Trucks. The push-pull headlight switch might have been manufactured with electrical contacts which allow an intermittent headlight circuit. An intermittent circuit could cause the headlights to flicker or suddenly go out. Sudden loss of the headlights under severe weather or nighttime driving conditions could reduce driver visibility which might result in a vehicle crash without prior warning.

Until you have had an opportunity to have your Chevrolet corrected, you should be alert for signs of an intermittent headlight circuit. For example, you might experience flickering headlights or temporary delay when you pull the headlight switch "ON."

To prevent this condition from occurring, please contact your Chevrolet dealer on or after the date shown below to arrange a service date to have your Chevrolet inspected. Your dealer will check the headlight switch. If necessary, the switch will be replaced. This service will be completed at no charge to you.

Instructions have been sent to your Chevrolet dealer. It is estimated that parts will be available October 1, 1986. The labor time to check the headlight

switch and replace it, if necessary, is about 35 minutes. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

Your Chevrolet Dealer is best equipped to obtain parts and provide service to ensure your vehicle is corrected as promptly as possible. However, if you take your vehicle to your dealer on the agreed service date, and they do not remedy this condition on that date or within five days, we recommend you contact the nearest Chevrolet Zone Office, either in person or by telephone. The Zone Office will assist you and the dealer in getting your vehicle corrected. The locations and telephone numbers of the Zone offices are listed in your Warranty and Owner Assistance Information Booklet which is in your glove compartment.

After contacting your dealer and the Zone Office, if you are still not satisfied that we have done our best to remedy this condition without charge and within a reasonable time, you may wish to write the Administrator, National Highway Traffic Safety Administration, 400 Seventh St., S.W., Washington, D.C. 20590 or call 800-424-9393 (Washington, D.C. residents use 426-0123). The enclosed owner reply card identifies your Chevrolet. Presentation of this card to your dealer will assist in making the inspection and correction in the shortest possible time. If you have sold or traded your vehicle, please complete the postage-paid card and return it to us. This will assist us in assuring all affected vehicles have been corrected.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your safety and continued satisfaction with our products.

Chevrolet Motor Division GENERAL MOTORS CORPORATION

Enclosure

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Lighting and Horns > Headlamp Switch > Component Information > Technical Service Bulletins > Recalls for Headlamp Switch: > 86C048 > May > 86 > Recall - Headlight Switch R&R;, Potential Headlight Loss

Recall - Headlight Switch R&R;, Potential Headlight Loss

NUMBER: 86-C-04

GROUP: 8 - Cab and Chassis Electrical

DATE: May, 1986

SUBJECT: PUSH-PULL HEADLIGHT SWITCH REPLACEMENT POTENTIAL LOSS OF HEADLIGHTS

MODELS: 1985 S/T15 AND P25-35 MODEL LIGHT DUTY TRUCKS 1986 C/K, G-VAN, MEDIUM DUTY AND HEAVY DUTY MODEL TRUCKS

The National Traffic and Motor Vehicle Safety Act, as amended, provides that each vehicle which is subject to a recall campaign of this type must be adequately repaired within a reasonable time after the owner has tendered it for repair. A failure to adequately repair within 60 days after tender of a vehicle is prima facie evidence of failure to repair within a reasonable time. If the condition is not adequately repaired within a reasonable time, the owner may be entitled to an identical or reasonably equivalent vehicle at no charge, or to a refund of the purchase price less a reasonable allowance for depreciation. To avoid having to provide these burdensome solutions, every effort must be made to promptly schedule appointments with owners and to repair their vehicles as soon as possible. As you will see in reading the attached copy of the letter which is being sent to owners, the owner is being instructed to contact the nearest GMC Zone Office if the dealer does not remedy the condition within five days of the mutually agreed upon service date. If the condition is not remedied within a reasonable time, they are instructed how to contact the National Highway Traffic Safety Administration.

Defect Involved

General Motors has determined that a defect which relates to motor vehicle safety exists in some 1985 S/T15 and P25-35 model light duty trucks and 1986 C/K, G Van, Medium Duty and Heavy Duty model trucks. The push-pull headlight switch might have been manufactured with electrical contacts which could potentially result in an intermittent headlight circuit. An intermittent circuit could cause the headlights to suddenly go out. Sudden loss of the headlights under severe weather or nighttime driving conditions could reduce driver visibility which might result in a vehicle crash without prior warning. To prevent this condition dealers are required to inspect, and if necessary, replace push-pull headlight switches on suspect vehicles.

VEHICLES INVOLVED

Involved are certain 1985 S/T15 and P25-35 model light duty trucks and 1986 C/K15-25-35, G15-25-35, C5-6-7, B6, P6, D9 and J8-9 model trucks equipped with push-pull type headlight switches built within the following VIN breakpoints:

Model

Year Model Plant From Through

1985 S/T15 Pontiac F0532010 F0532742

Moraine F2540848 F2542403

Shreveport F8543378 F8544409

P25-35 Detroit F3510322 F3510389

1986 C/K15-25-35 Flint Line #1 GF705361 GF705859

Flint Line #2 GF504763 GF505140

St. Louis GS504398 GS504945

Oshawa G1505088 G1505686

Janesville GJ504719 GJ505438

In addition:

1GTEK14C5GJ505451 1GTGC24M4GJ505462 1GTGK24MOGJ505476

G-Van Scarborough G4503996 G4504602

Lordstown G7500418 G7500675

C5-6-7 Pontiac GV500745 GV508121

B6 Pontiac GV505686 GV508119

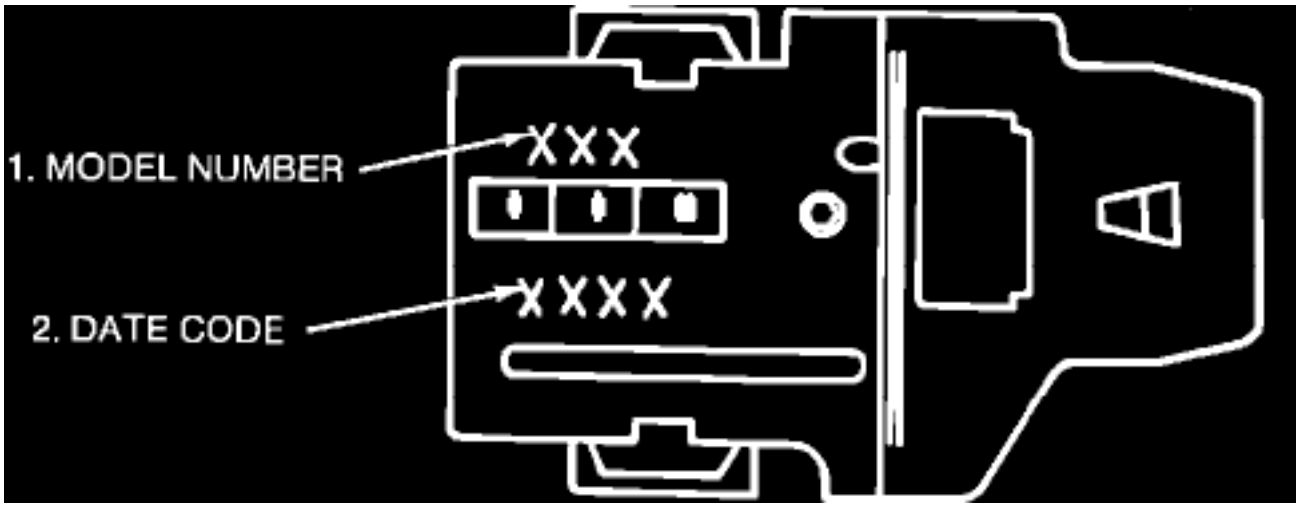
P6 Pontiac GV507800 GV508046

D9 Pontiac GV504851 GV505538

JB-9 Pontiac GV504835 GV505527

The specific vehicles involved in this campaign have been identified by Vehicle Identification Number Computer Listings. These listings are furnished to all involved dealers with the campaign bulletin. DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time forward. Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future,



you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle. Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin. If no owner's name and address were available to GMC Truck at the time of campaign initiation, the dealer will determine the owner's name and address from the dealership sales records. Please provide this information directly on the second copy of the listing next to the applicable VIN, so that our records may be updated and the appropriate notification mailed to the owner. This second copy should then be submitted to the address listed below in the previously supplied yellow campaign envelopes.

GMC Truck General Motors Corporation 101 Union Street Plymouth, Michigan 48170

OWNER NOTIFICATION

Owners wiU be notified of this campaign on their vehicles by GMC Truck (see copy of Owner Letter included with this bulletin). A listing of owner names and addresses has been furnished to the involved dealers to enable dealers to follow up with owners involved in this campaign. This listing may contain owner names and addresses obtained from state motor vehicle registration records. The use of such motor vehide registration data for any other purpose is a violation of law in several states. According, you are urged to limit the use of this listing to this campaign.

Service Procedure

During servicing, each suspect push-pull headlight switch must be inspected.. If the switch is not within the range of suspect date codes, it need not be replaced. See the Inspection Procedure for the inspection method and range of suspect date codes. Disassembly and assembly procedures can be found in the following applicable Truck Service Manuals:

1985 S/T15 X-8529 Section 8B-16

1985 P25-35 X-8532 Section 8B-16

1986 C/K & G X-8632 Section 8B-24

1986 Medium Duty X-8433 Section 8C-4

1986 Heavy Duty X-8534 Section 8C-5

Figure 1

INSPECTION PROCEDURE After removal of the Headlight Switch from the Instrument Panel, refer to the illustration to locate and identify the date code. The four-digit date code will appear the same on any switch regardless of the model usage or part number. If the date code is 0015 or between the range 9235 through 9305, replace the switch using the correct part number per the Parts Information section. (This represents switch manufacturing dates of September 23, 1985 through and including October 1, 1985. If the switch is not within the suspect date codes, reconnect the existing switch. Reassemble the Headlight Switch per the applicable Service Manual instructions.

PARTS INFORMATION

Parts are to be obtained from the Warehousing & Distribution Division of General Motors (WDDGM). To ensure that these parts will be obtained as soon as possible, they should be ordered from WDDGM on a C.I.O. order with no special instruction code, but order under an advise code (2).

Part

Model Number Description Quantity

S/T15 1995217 Headlight Switch 1

C/K15-25-35 1995216 Headlight Switch 1

G-Van 1995216 Headlight Switch 1

P25-35 1995216 Headlight Switch 1

C5-6-7, B6, P6, 1995194 Headlight Switch 1

J8-9, D9

WARRANTY INFORMATION Dealers should submit an accurately filled out Warranty Repair Order on each vehicle completed under this campaign.

Labor *Time

Operation AllowTrouble

Number Description ance Code

V3260 Headlamp Switch S/T 0.9 Hr. 96

Inspect Only C/K 0.3 Hr.

G & P 0.4 Hr.

C5-6-7, B6, 0.3 Hr.

P6, D9 J8-9

0.4 Hr.

V3262 Headlamp Switch S/T 0.9 Hr. 96

Inspect& Replace C/K 0.3 Hr.

G & P 0.4 Hr.

C5-6-7, B6, 0.3 Hr.

P6, D9 J8-9

0.4 Hr.

*For dealer to receive Administration Time Allowance associated with this campaign, add 0.1 hour to the Labor Operation Time Allowance. CAMPAIGN IDENTIFICATION LABEL

Each vehicle modified in accordance with the instructions outlined in this product campaign bulletin will require a "Campaign Identification Label". Each label provides a space to include the five (5) digit Dealer Code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen. Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner. Apply "Campaign Identification Label" only on a clean dry surface.

ADMINISTRATIVE PROCEDURE

Procedures covering this campaign are oudined in Section V of your dealership's "GMC Truck Claims Processing Manual" #SD8519. VEHICLES INVOLVED

In addition to the vehicles specified in Bulletin 86C-04, the following units should be included.

Model Year Model

Plant From Through

1986 P3 Detroit Assembly G3502163 G3502553

G Van Scarborough G4518889 G4520570

Lordstown G7511905 G7512484

C/K Janesville GJ521261 GJ522642

Flint #1 GF721388 GF722421

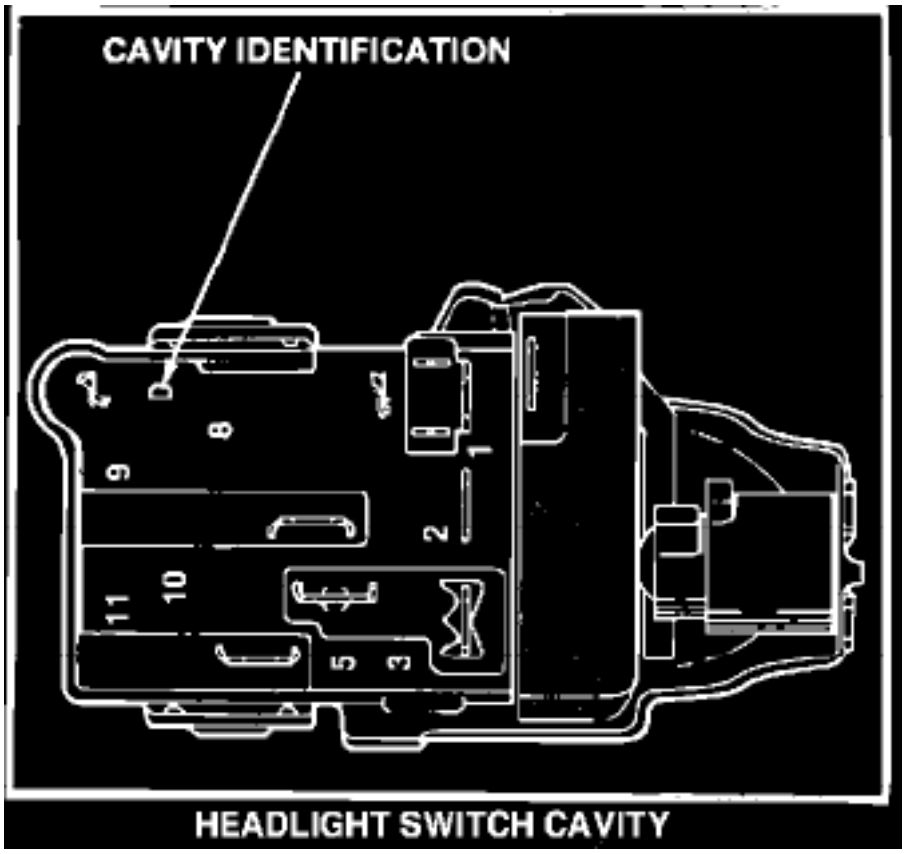
Flint #2 GF520150 GF521445

St. Louis GS520961 GS522584

Oshawa G1527436 G1529915

INSPECTION PROCEDURE

1986 GMC vehicles indicated above require a different inspection procedure from that described in Dealer Product Campaign Bulletin 86-C-04. If the alphabetically marked headlight switch cavity has either a "D" or an "M" identified, the switch must be replaced. The headlight switch cavity is on the opposite side of the switch from the date code indicated in 86-C-04.



HEADLIGHT SWITCH CAVITY

1. After removing the headlight switch from the instrument panel, refer to the illustration to locate and identify the cavity code.

2. If the cavity code is a "D" or an "M" replace the switch using the correct part number in the Parts Information section. If the switch does not have "D" or "M" codes, reconnect the existing switch.

3. Install the Campaign Completion label on a clean dry surface of the radiator core support.

Truck & Bus Group GMC Truck & Coach Operation General Motors Corporaton 31 Judson Street Pontiac, Michigan 48058 Dear GMC Truck Owner:

This notice is sent to you in accordance will the requirements of the National Traffic and Motor Vehicle Safety Act.

General Motors has determined that a defect which relates to motor vehicle safety exists in some 1985 S/T15 and P25-35 model light duty trucks and 1986 C/K, G-Van, Medium Duty and Heavy Duty model trucks.

The push-pull headlight switch might have been manufactured with electrical contacts which allow an intermittent headlight circuit. An intermittent circuit could cause the headlights to flicker or suddenly go out. Sudden loss of the headlights under severe weather or nighttime driving conditions could reduce driver visibility which might result in a vehicle crash without prior warning.

Until you have had an opportunity to have your GMC truck corrected, you should be alert for signs of an intermittent headlight circuit. For example, you might experience flickering headlights or temporary delay when you pull the headlight switch "ON."

To prevent this condition from occurring, please contact your GMC Truck dealer on or after the date shown below to arrange a service date to have your vehicle inspected. Your dealer will check the headlight switch. If necessary, the switch will be replaced. This service will be completed at no charge to you.

Instructions have been sent to your GMC Truck dealer. It is estimated that parts will be available to your dealer on May 8, 1986. The labor time necessary to check the headlight switch and replace it if necessary, is 35 minutes. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

Your GMC Truck dealer is best equipped to obtain parts and provide service to ensure your vehicle is corrected as promptly as possible. However, if you take your vehicle to your dealer on the agreed service date and they do not remedy this condition on that date or within five days, we recommend you contact your nearest GMC Truck Zone Office, either in person or by telephone. The Zone Office will assist you and your dealer in getting your vehicle corrected. The locations and telephone numbers of the Zone Offices are listed in your Owner's Manual.

After contacting your dealer and the Zone Office, if you are still not satisfied that we have done our best to remedy this condition without charge within a reasonable time, you may wish to write the Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590, or call 800-424-9393 (Washington, D.C. residents use 426-0123).

The enclosed owner reply card identifies your vehicle. Presentation of this card to your dealer will assist them in making the necessary correction to your vehicle in the shortest possible time. If you have sold or traded your vehicle, please let us know by completing the postage paid owner reply card and returning it to us.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your safety and continued satisfaction with our products.

Headlamp Switch: Recalls Recall 86V056000: Headlight Switch Defect

THE PUSH-PULL HEADLIGHT SWITCH MAY HAVE ELECTRICAL CONTACTS WHICH ALLOW AN INTERMITTENT HEADLIGHT CIRCUIT CAUSING HEADLIGHT TO FLICKER OR SUDDENLY GO OUT.

CONSEQUENCE OF DEFECT: SUDDEN LOSS OF THE HEADLIGHTS UNDER SEVERE WEATHER OR NIGHTTIME DRIVING CONDITIONS COULD REDUCE DRIVER VISIBILITY WHICH MIGHT RESULT IN A VEHICLE CRASH WITHOUT PRIOR WARNING.

NOTE: ALSO, SEE NHTSA CAMPAIGN NUMBER 86V131000. REPLACE HEADLIGHT SWITCH AS NECESSARY.

SYSTEM: HEADLIGHT SWITCH.

VEHICLE DESCRIPTION: PASSENGER CARS, TRUCKS AND VANS.

1985 CHEVROLET TRUCK CHEVROLET TRUCK 1985 GMC GMC 1986 BUICK ESTATE 1986 CADILLAC CIMARRON 1986 CADILLAC DEVILLE 1986 CADILLAC FLEETWOOD 1986 CHEVROLET CAMARO 1986 CHEVROLET CAVALIER 1986 CHEVROLET CELEBRITY 1986 CHEVROLET CHEVETTE 1986 CHEVROLET CORVETTE 1986 CHEVROLET MONTE CARLO 1986 CHEVROLET TRUCK CHEVROLET TRUCK 1986 GM OF CANADA GM OF CANADA 1986 GMC GMC 1986 PONTIAC 1000 1986 PONTIAC 6000 1986 PONTIAC BONNEVILLE 1986 PONTIAC GRAND PRIX 1986 PONTIAC PARISIENNE 1986 PONTIAC SUNBIRD

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Lighting and Horns > Headlamp Switch > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Headlamp Switch: > 86C05A > Sep > 86 > Recall - Push-Pull Headlight Switch Replacement

Recall - Push-Pull Headlight Switch Replacement

Number: REISSUE 86C05(a)

Section: 8B

Date: September, 1986

Subject: PRODUCT SAFETY CAMPAIGN 86CO5(a) PUSH-PULL HEADLIGHT SWITCH REPLACEMENT

Model and Year: 1986 CHEVROLET PASSENGER CARS, MEDIUM DUTY TRUCKS AND 1985-1986 LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

THIS BULLETIN IS BEING REISSUED TO SUPERSEDE PRODUCT CAMPAIGN BULLETIN 86C05 DATED MAY, 1986. UPON RECEIPT OF THE REISSUED BULLETIN 86CO5(a) DESTROY 86CO5.

The National Traffic and Motor Vehicle Safety Act, as amended, provides that each vehicle which is subject to a recall campaign of this type must be adequately repaired within a reasonable time after the owner has tendered it for repair. A failure to adequately repair within 60 days after tender of a vehicle is prima facie evidence of failure to repair within a reasonable time.

If the condition is not adequately repaired within a reasonable time, the owners may be entitled to an identical or reasonably equivalent vehicle at no charge or to a refund of the purchase price less a reasonable allowance for depreciation.

To avoid having to provide these burdensome solutions, every effort must be made to promptly schedule an appointment with each owner and to repair their vehicle as soon as possible. As you will see in reading the attached copy of the letter which is being sent to owners, the owners are being instructed to contact the nearest Chevrolet Zone Office if their dealer does not remedy the condition within five days of the mutually agreed upon service date. If the condition is not remedied within a reasonable time, they are instructed on how to contact the National Highway Traffic Safety Administration.

CONDITION

General Motors has determined that a defect which relates to motor vehicle safety exists in some 1986 Chevrolet Passenger Cars Medium Duty Trucks and 1985-1986 Light Duty Trucks. The push-pull headlight switch might have been manufactured with electrical contacts which could potentially result in an intermittent headlight circuit. An intermittent circuit could cause the headlights to suddenly go out. Sudden loss of the headlights under severe weather or nighttime driving conditions could reduce driver visibility which might result in a vehicle crash without prior warning.

DEALER ACTION

To prevent this condition dealers are required to inspect, and if necessary, replace push-pull headlight switches on suspect vehicles per the Vehicles Involved and Service Procedure sections of this bulletin.

Vehicles Involved

Certain 1986 Chevrolet Passenger Cars, Medium Duty and 1985-1986 Light Duty Trucks within the following parameters:

YEAR PLANT FROM THROUGH

"S/T" LIGHT DUTY TRUCKS

1985 Pontiac F0213991 F0217303

1985 Moraine F2261445 F2266283

"P" FWD. CONTROL TRUCKS

1985 Detroit F3345668 F3346279

1986 Detroit G3315972 G3317552

CELEBRITY

1986 Oklahoma City G6117716 G6121696

G6222460 G6230910

1986 Oshawa G1126879 G1127808

G1227276 G1237184

1986 Framingham GG104644 GG104779

GG131917 GG135586

CAMARO

1986 Van Nuys GL108269 GL111008

GL169838 GL171816

Norwood GN112086 GN115431

GN149765 GN165774

MONTE CARLO

1986 Arlington GR112552 GR116439

GR174982 GR179215

CAVALIER (EXCEPT JE & JF SERIES)

1986 Leeds GK110420 GK112653

GK145880 GK148445

1986 Lordstown G7119205 G7124854

G7204309 G7208597

1986 Janesville GJ119727 GJ130584

GJ212326 GJ239084

# Denotes Change YEAR

PLANT FROM THROUGH

CHEVETTE

1986 Lakewood GA115292 GA117670

GA175188 GA178124

CORVETTE

1986 Bowling Green G5108246 G5108469

MEDIUM DUTY (CONVENTIONAL)

1986 Pontiac GV102035 GV107076

MEDIUM DUTY (P6T042)

1986 Pontiac GV106812 GV106880

MEDIUM DUTY (B6P042 SCHOOL BUS)

1986 Pontiac GV106353 GV107074

"C/K" LIGHT DUTY TRUCKS

1986 Janesville GJ113536

GJ115892

GJ155888

GJ159088

1986 St. Louis GS114175

GS116322

GS163672

GS168176

1986 Oshava #2 G1115519

G1117574

G1177130

G1183207

1986 Flint #1 GF318360

GF319976

GF388768

GF393843

1986 Flint #2 GF113688 GF114911

GF167051 GF170532

"G" VAN

1986 Lordstown G7103939 G7105085

G7163429 G7166183

1986 Scarborough G4110625 G4113044

G4148711 G4151868

Involved vehicles have been identified by Vehicle Identification Number Computer Listings. Computer listings contain the complete Vehicle Identification Number, owner name and address data, and are furnished to the involved dealers with the campaign bulletin. Owner name and address data furnished will enable dealers to follow-up with owners involved in this campaign.

# Denotes Change

These listings may contain owner names and addresses obtained from State Motor Vehicle Registration Records. The use of such motor vehicle registration data for any other purpose is a violation of law in several states. Accordingly, you are urged to limit the use of this listing to the follow-up necessary to complete this campaign. Any dealer not receiving a computer listing with the campaign bulletin has no vehicles currently assigned.

OWNER NOTIFICATION

Owners will be notified of this campaign on their vehicles by Chevrolet Motor Division (see copy of Owner Letter included with this bulletin).

DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time forward.

Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future, you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle.

Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin.

Parts Information

The following push-pull headlight switches will be required, if inspection indicates replacement is necessary.

Parts required to complete this modification are to be obtained from General Motors Warehousing and Distribution Division (GMWDD). To ensure that these parts will be obtained as soon as possible they should be ordered from GMWDD on a C.I.O. order with no special instruction code, but on an advise code (2).

MODEL PART NUMBER QUANTITY

Celebrity, Monte Carlo, 1995217 1 Per Vehicle

Cavalier, Chevette & "S/T" Trucks

Camaro 1995226 1 Per Vehicle

Corvette 1995257 1 Per Vehicle

MODEL PART NUMBER QUANTITY

"C/K" Light Duty 1995216 1 Per Vehicle

Trucks, "G" Vans and "P" Fwd Control

Medium Duty 1995194 1 Per Vehicle

Conventional, P6T042 & School Bus

Service Procedure

NOTE: EACH SUSPECT PUSH-PULL HEADLIGHT SWITCH MUST BE INSPECTED. THERE ARE TWO DIFFERENT INSPECTION PROCEDURES DEPENDING ON SUSPECT DATE PERIOD OF SWITCH. ONE REQUIRES INSPECTION OF A "DATE CODE"; THE OTHER A

"CAVITY CODE." IF THE SWITCH IS NOT WITHIN THE SUSPECT DATE CODES, OR CAVITY CODES, IT NEED NOT BE REPLACED. SEE INSPECTION PROCEDURE.

I.Headlamp Switch Removal

I. Headlamp Switch Removal. Refer to appropriate passenger car or truck Service Manual.

^ 1985 S/T Light Duty Truck - "1985 S-10 Light Duty Truck Shop Manual" (ST-369-85) page 8B-16.

^ 1985 "P" Fwd Control - "1985 10-30 Series Light Duty Truck Shop Manual" (ST-330-85) page 8B-16. Follow the procedure for "G" Series Trucks.

^ 1986 Monte Carlo - "1986 Caprice, Monte Carlo, El Camino Service Manual" (ST-384-86) page 8B-18.

^ 1986 Camaro - "1986 Camaro Service Manual" (ST-386-86) page 8B-17.

^ 1986 Cavalier - "1986 Cavalier Shop Manual" (ST-366-86) page 8C-2.

^ 1986 Celebrity - "1986 Celebrity Shop Manual" (ST-365-86) page 8C-3.

^ 1986 Chevette - "1986 Chevette Shop Manual" (ST-357-86) page 8B-16

^ 1986 "C, K, G" Light Duty Trucks - "1986 10-30 Series Light

Duty Truck Shop Manual" (ST-330-86) page 8B-24. 1986 "P" Fwd. Control Follow the procedure for "G" series trucks.

^ 1986 Medium Duty Trucks - "1986 Medium Duty Trucks Service Manual" (ST-31-84) page 8C-4.

# Denotes Change

^ 1986 Corvette - The 1986 Corvette Shop Manual provides very limited information on headlamp switch replacement. We have, therefore, provided a removal procedure that can be used.

a) Disconnect battery ground cable.

b) Remove light switch knob (spring loaded) and steering wheel tilt lever.

c) Remove cluster bezel from I.P.

d) Remove light switch nut.

e) Remove fuse panel cover and I.P. right side trim plate.

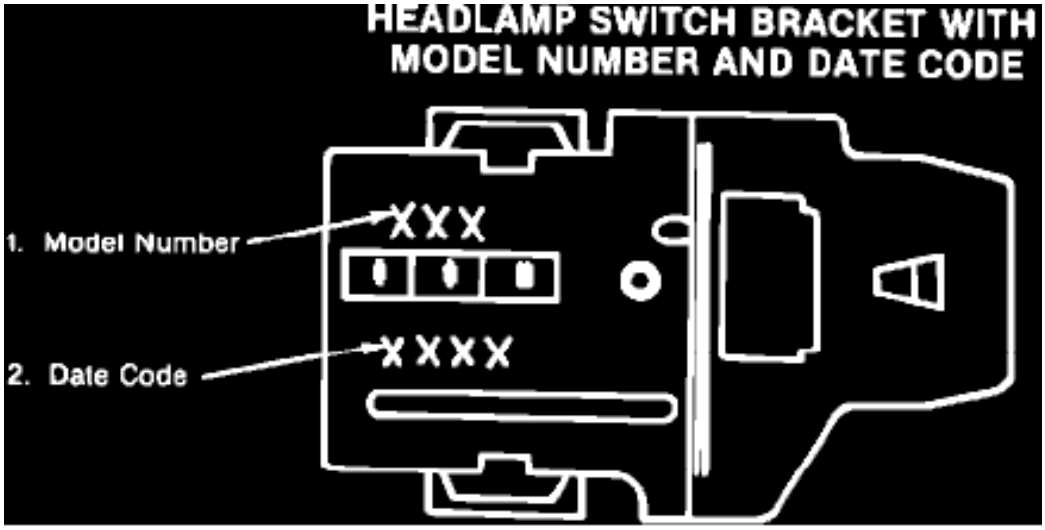
f) Remove I.P. pad.

g) Disconnect electrical connector from headlamp switch.

h) Refer to Section II for inspection and reinstallation procedure.

VEHICLES IDENTIFIED BY A (#) SIGN IN THE "VEHICLES INVOLVED" SECTION SHOULD REFER TO SECTION III FOR "CAVITY CODE" INSPECTION/ REINSTALLATION INSTRUCTIONS. ALL OTHER VEHICLES USE THE "DATE CODE" INSPECTION/REINSTALLATION INSTRUCTIONS IN SECTION II.

II."Date Code" Inspection Procedure and Reinstallation of Headlamp


HEADLAMP SWITCH BRACKET WITH
MODEL NUMBER AND DATE CODE
1. Model Number
XXX
2. Date Code
XXXX

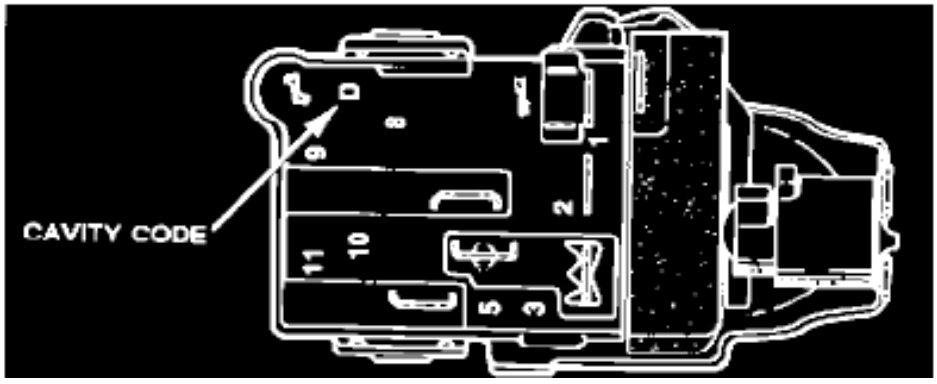

CAVITY CODE
9
8
1
2
11
10
5
3

FIGURE 1

1. After removing the Headlight Switch from the Instrument Panel, refer to Figure 1 to locate and identify the date code.

2. The four digit date code will appear the same on any switch regardless of the model usage or part number.

3. If the date code is 0015 or between the range 9235 through 9305, replace the switch using the correct part number per the Parts Information section.

If the switch is not within the suspect date codes, reconnect the existing switch. Proceed to step 4.

4. Reassemble the Headlight Switch and I/P Trimplate per the applicable Service Information Manual instructions.

5. Install the Campaign Identification Label.

# Denotes Change

III. Cavity Code Inspection Proc. & Reinstallation of Headlamp Switch

FIGURE 2 - LOCATION OF CAVITY CODE ON INSTRUMENT PANEL

1. After removing the headlight switch from the Instrument Panel I.P.), refer to Figure 2 to locate and identify the cavity code.

2. The alphabetical cavity code will appear in the same area on any switch regardless of the model usage or part number.

3. If the cavity code is a "D" or "M", replace the switch using the correct part number per the Parts Information section.

If the switch does not have the suspect alphabetical cavity codes, reconnect the existing switch. Proceed to step 4.

4. Reassemble the headlight switch and I.P. trimplate per the applicable Service Information Manual instructions.

5. Install the Campaign Identification Label.

CAMPAIGN IDENTIFICATION LABEL

CAMPAIGN IDENTIFICATION LABEL

Each vehicle modified in accordance with the instructions outlined in this Product Campaign Bulletin will require a "Campaign Identification Label." Each label provides a space to include the five digit dealer code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen. Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner.

Apply "Campaign Identification Label" only on a clean dry surface.

Claim Information

Submit a Product Campaign Claim with the information indicated below:

	REPAIR PERFORMED	PC	FAILED PART NO.	* PARTS ALLOW	FC	LABOR OP	LAB HRS	* OTH HRS
#	• INSPECT HEADLIGHT SWITCH 1986 CHEVETTE, "C", "K" & M.D. TRUCK				00	V3260	.3	.1
#	• INSPECT HEADLIGHT SWTICH 1986 MONTE CARLO, "G" VAN & 1985-86 "P" FWD CONTROL MODELS				0	V3262	.4	.1
	• INSPECT HEADLIGHT SWITCH 1986 CELEBRITY & CAVALIER MODELS				00	V3266	.5	.1
	• INSPECT HEADLIGHT SWITCH 1986 CAMARO MODELS				0	V3267	.6	.1
	• INSPECT HEADLIGHT SWITCH 1986 CORVETTE MODELS				00	V3268	.7	.1
#	• INSPECT HEADLIGHT SWITCH 1985 "S/T" TRUCK MODELS				00	V3269	.9	.1
#	• INSPECT AND REPLACE HEADLIGHT SWITCH 1986 CHEVETTE, "C", "K" & M.D. TRUCK		1995217 1995216 1995194	**	00	V3350	.3	.1
#	• INSPECT AND REPLACE HEADLIGMT SWITCH 1986 MONTE CARLO "G" VAN & 1985-86 "P" FWD CONTROL MODELS		1995217 1995216	**	00	V3351	.4	.1
	• INSPECT AND REPLACE HEADLIGHT SWITCH 1986 CELEBRITY & CAVALIER MODELS		1995217	**	00	V3352	.5	.1
	• INSPECT AND REPLACE HEADLIGHT SWITCH 1986 CAMARO MODELS		1995226	**	00	V3353	.6	.1
	• INSPECT AND REPLACE HEADLIGHT SWITCH 1986 CORVETTE MODELS		1995257	**	00	V3354	.7	.1
#	• INSPECT AND REPLACE HEADLIGHT SWITCH 1985 "S/T" TRUCK MODELS		1995217	**	00	V3355	.9	.1

*Campaign Administrative Allowance.

**The Parts Allowance should be the sum total of the current GMWDD Dealer Net plus 30% of all parts required for the repair.

Dealers will automatically receive the correct labor allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

# DENOTES CHANGE

(Notification Used By Chevrolet Motor Division)

Dear Chevrolet Owner:

This notice is sent to you in accordance with the requirements of the National Traffic and Motor Vehicle Safety Act.

General Motors has determined that a defect which relates to motor vehicle safety exists in some 1986 Chevrolet Passenger Cars and Medium Duty Trucks and 1985-1986 Light Duty Trucks. The push-pull headlight switch might have been manufactured with electrical contacts which allow an intermittent headlight circuit. An intermittent circuit could cause the headlights to flicker or suddenly go out. Sudden loss of the headlights under severe weather or nighttime driving conditions could reduce driver visibility which might result in a vehicle crash without prior warning.

Until you have had an opportunity to have your Chevrolet corrected, you should be alert for signs of an intermittent headlight circuit. For example, you might experience flickering headlights or temporary delay when you pull the headlight switch "ON."

To prevent this condition from occurring, please contact your Chevrolet dealer on or after the date shown below to arrange a service date to have your Chevrolet inspected. Your dealer will check the headlight switch. If necessary, the switch will be replaced. This service will be completed at no charge to you.

Instructions have been sent to your Chevrolet dealer. It is estimated that parts will be available October 1, 1986. The labor time to check the headlight

switch and replace it, if necessary, is about 35 minutes. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

Your Chevrolet Dealer is best equipped to obtain parts and provide service to ensure your vehicle is corrected as promptly as possible. However, if you take your vehicle to your dealer on the agreed service date, and they do not remedy this condition on that date or within five days, we recommend you contact the nearest Chevrolet Zone Office, either in person or by telephone. The Zone Office will assist you and the dealer in getting your vehicle corrected. The locations and telephone numbers of the Zone offices are listed in your Warranty and Owner Assistance Information Booklet which is in your glove compartment.

After contacting your dealer and the Zone Office, if you are still not satisfied that we have done our best to remedy this condition without charge and within a reasonable time, you may wish to write the Administrator, National Highway Traffic Safety Administration, 400 Seventh St., S.W., Washington, D.C. 20590 or call 800-424-9393 (Washington, D.C. residents use 426-0123). The enclosed owner reply card identifies your Chevrolet. Presentation of this card to your dealer will assist in making the inspection and correction in the shortest possible time. If you have sold or traded your vehicle, please complete the postage-paid card and return it to us. This will assist us in assuring all affected vehicles have been corrected.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your safety and continued satisfaction with our products.

Chevrolet Motor Division GENERAL MOTORS CORPORATION

Enclosure

Recall - Headlight Switch R&R;, Potential Headlight Loss

NUMBER: 86-C-04

GROUP: 8 - Cab and Chassis Electrical

DATE: May, 1986

SUBJECT: PUSH-PULL HEADLIGHT SWITCH REPLACEMENT POTENTIAL LOSS OF HEADLIGHTS

MODELS: 1985 S/T15 AND P25-35 MODEL LIGHT DUTY TRUCKS 1986 C/K, G-VAN, MEDIUM DUTY AND HEAVY DUTY MODEL TRUCKS

The National Traffic and Motor Vehicle Safety Act, as amended, provides that each vehicle which is subject to a recall campaign of this type must be adequately repaired within a reasonable time after the owner has tendered it for repair. A failure to adequately repair within 60 days after tender of a vehicle is prima facie evidence of failure to repair within a reasonable time. If the condition is not adequately repaired within a reasonable time, the owner may be entitled to an identical or reasonably equivalent vehicle at no charge, or to a refund of the purchase price less a reasonable allowance for depreciation. To avoid having to provide these burdensome solutions, every effort must be made to promptly schedule appointments with owners and to repair their vehicles as soon as possible. As you will see in reading the attached copy of the letter which is being sent to owners, the owner is being instructed to contact the nearest GMC Zone Office if the dealer does not remedy the condition within five days of the mutually agreed upon service date. If the condition is not remedied within a reasonable time, they are instructed how to contact the National Highway Traffic Safety Administration.

Defect Involved

General Motors has determined that a defect which relates to motor vehicle safety exists in some 1985 S/T15 and P25-35 model light duty trucks and 1986 C/K, G Van, Medium Duty and Heavy Duty model trucks. The push-pull headlight switch might have been manufactured with electrical contacts which could potentially result in an intermittent headlight circuit. An intermittent circuit could cause the headlights to suddenly go out. Sudden loss of the headlights under severe weather or nighttime driving conditions could reduce driver visibility which might result in a vehicle crash without prior warning. To prevent this condition dealers are required to inspect, and if necessary, replace push-pull headlight switches on suspect vehicles.

VEHICLES INVOLVED

Involved are certain 1985 S/T15 and P25-35 model light duty trucks and 1986 C/K15-25-35, G15-25-35, C5-6-7, B6, P6, D9 and J8-9 model trucks equipped with push-pull type headlight switches built within the following VIN breakpoints:

Model

Year Model Plant From Through

1985 S/T15 Pontiac F0532010 F0532742

Moraine F2540848 F2542403

Shreveport F8543378 F8544409

P25-35 Detroit F3510322 F3510389

1986 C/K15-25-35 Flint Line #1 GF705361 GF705859

Flint Line #2 GF504763 GF505140

St. Louis GS504398 GS504945

Oshawa G1505088 G1505686

Janesville GJ504719 GJ505438

In addition:

1GTEK14C5GJ505451 1GTGC24M4GJ505462 1GTGK24MOGJ505476

G-Van Scarborough G4503996 G4504602

Lordstown G7500418 G7500675

C5-6-7 Pontiac GV500745 GV508121

B6 Pontiac GV505686 GV508119

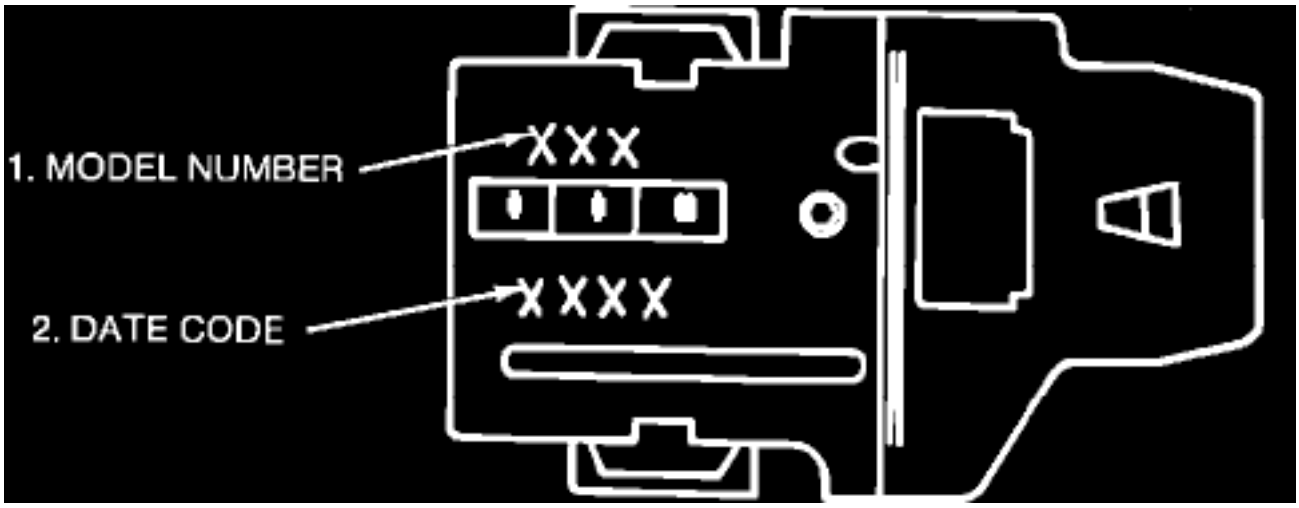
P6 Pontiac GV507800 GV508046

D9 Pontiac GV504851 GV505538

JB-9 Pontiac GV504835 GV505527

The specific vehicles involved in this campaign have been identified by Vehicle Identification Number Computer Listings. These listings are furnished to all involved dealers with the campaign bulletin. DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time forward. Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future,



you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle. Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin. If no owner's name and address were available to GMC Truck at the time of campaign initiation, the dealer will determine the owner's name and address from the dealership sales records. Please provide this information directly on the second copy of the listing next to the applicable VIN, so that our records may be updated and the appropriate notification mailed to the owner. This second copy should then be submitted to the address listed below in the previously supplied yellow campaign envelopes.

GMC Truck General Motors Corporation 101 Union Street Plymouth, Michigan 48170

OWNER NOTIFICATION

Owners wiU be notified of this campaign on their vehicles by GMC Truck (see copy of Owner Letter included with this bulletin). A listing of owner names and addresses has been furnished to the involved dealers to enable dealers to follow up with owners involved in this campaign. This listing may contain owner names and addresses obtained from state motor vehicle registration records. The use of such motor vehide registration data for any other purpose is a violation of law in several states. According, you are urged to limit the use of this listing to this campaign.

Service Procedure

During servicing, each suspect push-pull headlight switch must be inspected.. If the switch is not within the range of suspect date codes, it need not be replaced. See the Inspection Procedure for the inspection method and range of suspect date codes. Disassembly and assembly procedures can be found in the following applicable Truck Service Manuals:

1985 S/T15 X-8529 Section 8B-16

1985 P25-35 X-8532 Section 8B-16

1986 C/K & G X-8632 Section 8B-24

1986 Medium Duty X-8433 Section 8C-4

1986 Heavy Duty X-8534 Section 8C-5

Figure 1

INSPECTION PROCEDURE After removal of the Headlight Switch from the Instrument Panel, refer to the illustration to locate and identify the date code. The four-digit date code will appear the same on any switch regardless of the model usage or part number. If the date code is 0015 or between the range 9235 through 9305, replace the switch using the correct part number per the Parts Information section. (This represents switch manufacturing dates of September 23, 1985 through and including October 1, 1985. If the switch is not within the suspect date codes, reconnect the existing switch. Reassemble the Headlight Switch per the applicable Service Manual instructions.

PARTS INFORMATION

Parts are to be obtained from the Warehousing & Distribution Division of General Motors (WDDGM). To ensure that these parts will be obtained as soon as possible, they should be ordered from WDDGM on a C.I.O. order with no special instruction code, but order under an advise code (2).

Part

Model Number Description Quantity

S/T15 1995217 Headlight Switch 1

C/K15-25-35 1995216 Headlight Switch 1

G-Van 1995216 Headlight Switch 1

P25-35 1995216 Headlight Switch 1

C5-6-7, B6, P6, 1995194 Headlight Switch 1

J8-9, D9

WARRANTY INFORMATION Dealers should submit an accurately filled out Warranty Repair Order on each vehicle completed under this campaign.

Labor *Time

Operation AllowTrouble

Number Description ance Code

V3260 Headlamp Switch S/T 0.9 Hr. 96

Inspect Only C/K 0.3 Hr.

G & P 0.4 Hr.

C5-6-7, B6, 0.3 Hr.

P6, D9 J8-9

0.4 Hr.

V3262 Headlamp Switch S/T 0.9 Hr. 96

Inspect& Replace C/K 0.3 Hr.

G & P 0.4 Hr.

C5-6-7, B6, 0.3 Hr.

P6, D9 J8-9

0.4 Hr.

*For dealer to receive Administration Time Allowance associated with this campaign, add 0.1 hour to the Labor Operation Time Allowance. CAMPAIGN IDENTIFICATION LABEL

Each vehicle modified in accordance with the instructions outlined in this product campaign bulletin will require a "Campaign Identification Label". Each label provides a space to include the five (5) digit Dealer Code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen. Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner. Apply "Campaign Identification Label" only on a clean dry surface.

ADMINISTRATIVE PROCEDURE

Procedures covering this campaign are oudined in Section V of your dealership's "GMC Truck Claims Processing Manual" #SD8519. VEHICLES INVOLVED

In addition to the vehicles specified in Bulletin 86C-04, the following units should be included.

Model Year Model

Plant From Through

1986 P3 Detroit Assembly G3502163 G3502553

G Van Scarborough G4518889 G4520570

Lordstown G7511905 G7512484

C/K Janesville GJ521261 GJ522642

Flint #1 GF721388 GF722421

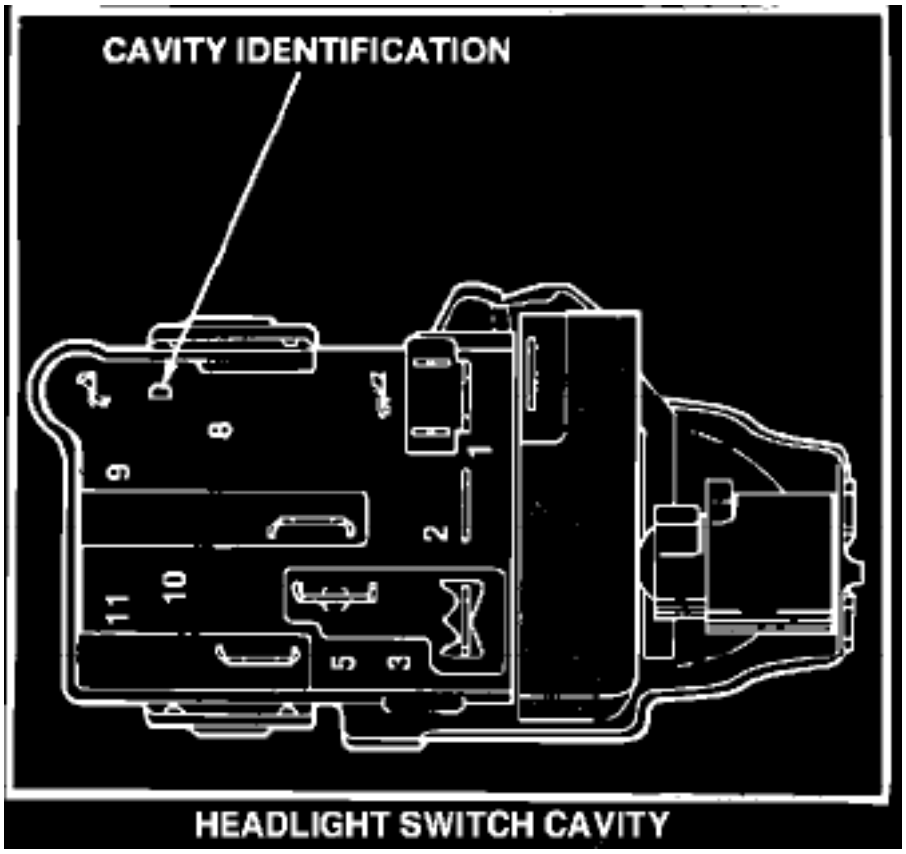
Flint #2 GF520150 GF521445

St. Louis GS520961 GS522584

Oshawa G1527436 G1529915

INSPECTION PROCEDURE

1986 GMC vehicles indicated above require a different inspection procedure from that described in Dealer Product Campaign Bulletin 86-C-04. If the alphabetically marked headlight switch cavity has either a "D" or an "M" identified, the switch must be replaced. The headlight switch cavity is on the opposite side of the switch from the date code indicated in 86-C-04.



HEADLIGHT SWITCH CAVITY

1. After removing the headlight switch from the instrument panel, refer to the illustration to locate and identify the cavity code.

2. If the cavity code is a "D" or an "M" replace the switch using the correct part number in the Parts Information section. If the switch does not have "D" or "M" codes, reconnect the existing switch.

3. Install the Campaign Completion label on a clean dry surface of the radiator core support.

Truck & Bus Group GMC Truck & Coach Operation General Motors Corporaton 31 Judson Street Pontiac, Michigan 48058 Dear GMC Truck Owner:

This notice is sent to you in accordance will the requirements of the National Traffic and Motor Vehicle Safety Act.

General Motors has determined that a defect which relates to motor vehicle safety exists in some 1985 S/T15 and P25-35 model light duty trucks and 1986 C/K, G-Van, Medium Duty and Heavy Duty model trucks.

The push-pull headlight switch might have been manufactured with electrical contacts which allow an intermittent headlight circuit. An intermittent circuit could cause the headlights to flicker or suddenly go out. Sudden loss of the headlights under severe weather or nighttime driving conditions could reduce driver visibility which might result in a vehicle crash without prior warning.

Until you have had an opportunity to have your GMC truck corrected, you should be alert for signs of an intermittent headlight circuit. For example, you might experience flickering headlights or temporary delay when you pull the headlight switch "ON."

To prevent this condition from occurring, please contact your GMC Truck dealer on or after the date shown below to arrange a service date to have your vehicle inspected. Your dealer will check the headlight switch. If necessary, the switch will be replaced. This service will be completed at no charge to you.

Instructions have been sent to your GMC Truck dealer. It is estimated that parts will be available to your dealer on May 8, 1986. The labor time necessary to check the headlight switch and replace it if necessary, is 35 minutes. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

Your GMC Truck dealer is best equipped to obtain parts and provide service to ensure your vehicle is corrected as promptly as possible. However, if you take your vehicle to your dealer on the agreed service date and they do not remedy this condition on that date or within five days, we recommend you contact your nearest GMC Truck Zone Office, either in person or by telephone. The Zone Office will assist you and your dealer in getting your vehicle corrected. The locations and telephone numbers of the Zone Offices are listed in your Owner's Manual.

After contacting your dealer and the Zone Office, if you are still not satisfied that we have done our best to remedy this condition without charge within a reasonable time, you may wish to write the Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590, or call 800-424-9393 (Washington, D.C. residents use 426-0123).

The enclosed owner reply card identifies your vehicle. Presentation of this card to your dealer will assist them in making the necessary correction to your vehicle in the shortest possible time. If you have sold or traded your vehicle, please let us know by completing the postage paid owner reply card and returning it to us.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your safety and continued satisfaction with our products.

Headlamp Switch: All Technical Service Bulletins Recall 86V056000: Headlight Switch Defect

THE PUSH-PULL HEADLIGHT SWITCH MAY HAVE ELECTRICAL CONTACTS WHICH ALLOW AN INTERMITTENT HEADLIGHT CIRCUIT CAUSING HEADLIGHT TO FLICKER OR SUDDENLY GO OUT.

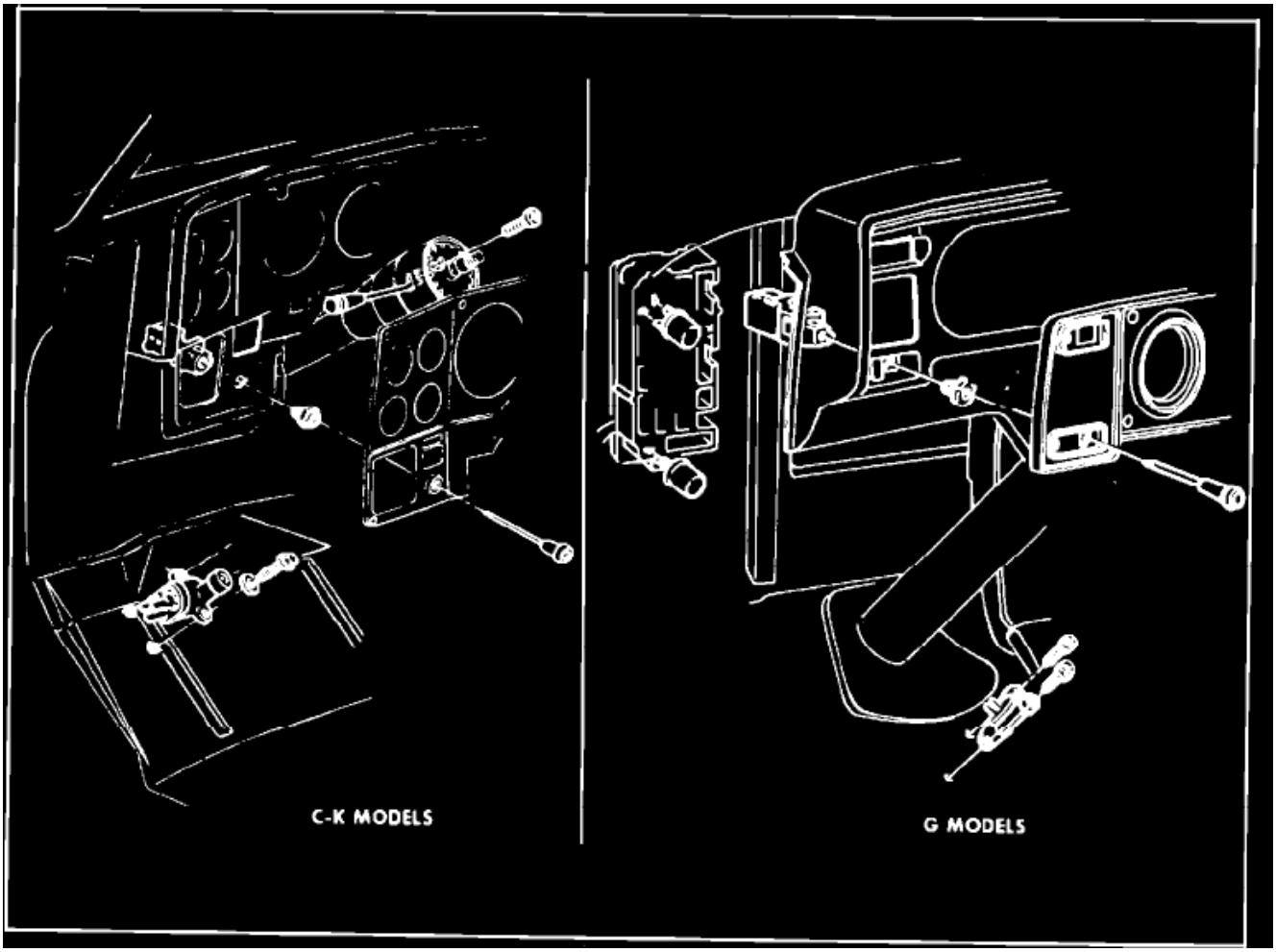
CONSEQUENCE OF DEFECT: SUDDEN LOSS OF THE HEADLIGHTS UNDER SEVERE WEATHER OR NIGHTTIME DRIVING CONDITIONS COULD REDUCE DRIVER VISIBILITY WHICH MIGHT RESULT IN A VEHICLE CRASH WITHOUT PRIOR WARNING.

NOTE: ALSO, SEE NHTSA CAMPAIGN NUMBER 86V131000. REPLACE HEADLIGHT SWITCH AS NECESSARY.

SYSTEM: HEADLIGHT SWITCH.

VEHICLE DESCRIPTION: PASSENGER CARS, TRUCKS AND VANS.

1985 CHEVROLET TRUCK CHEVROLET TRUCK 1985 GMC GMC 1986 BUICK ESTATE 1986 CADILLAC CIMARRON 1986 CADILLAC DEVILLE 1986 CADILLAC FLEETWOOD 1986 CHEVROLET CAMARO 1986 CHEVROLET CAVALIER 1986 CHEVROLET CELEBRITY 1986 CHEVROLET CHEVETTE 1986 CHEVROLET CORVETTE 1986 CHEVROLET MONTE CARLO 1986 CHEVROLET TRUCK CHEVROLET TRUCK 1986 GM OF CANADA GM OF CANADA 1986 GMC GMC 1986 PONTIAC 1000 1986 PONTIAC 6000 1986 PONTIAC BONNEVILLE 1986 PONTIAC GRAND PRIX 1986 PONTIAC PARISIENNE 1986 PONTIAC SUNBIRD



Headlamp Switch: Service and Repair

Fig. 9 Headlamp switch. C, G, K, R & V models

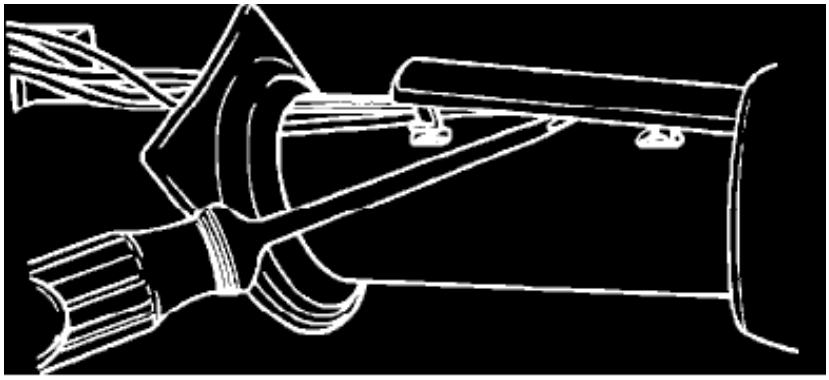
G MODELS

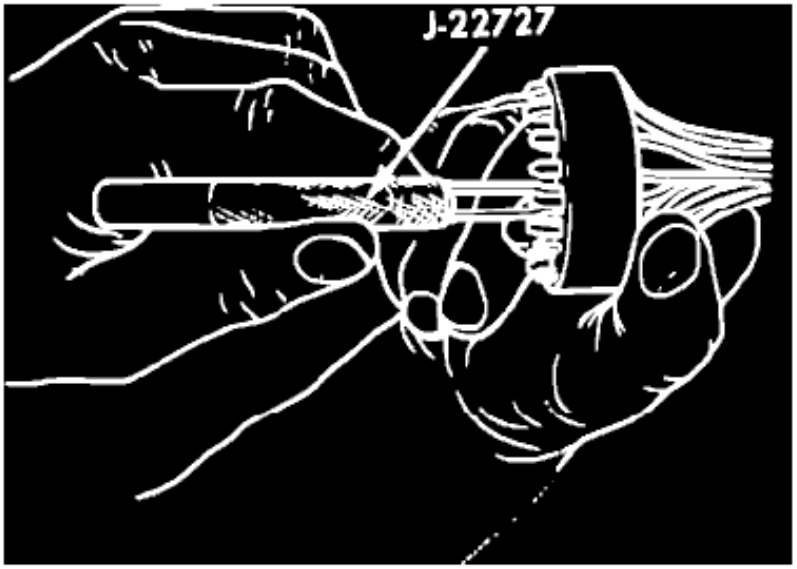
1. Disconnect battery ground cable.

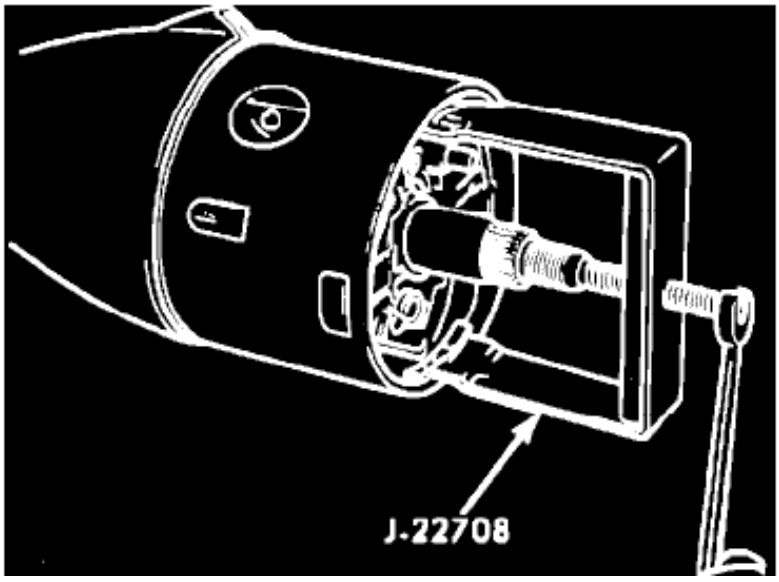
2. Reaching from behind instrument panel, depress shaft retaining button and remove switch knob and shaft.

3. Remove switch retaining nut from front of instrument panel, Fig. 9, then push switch from panel opening, disconnect wiring connector and remove from vehicle.

4. Reverse procedure to install.




J-22727


J-22708

Turn Signal Switch: Service and Repair

Fig. 3 Removing wiring harness protector. 1980---85 G & 1980---87 P models

Fig. 4 Removing wires from connector. 1980---85 G & 1980---87 P models

Fig. 5 Removing turn signal housing cover. 1980---85 G & 1980---87 P models

1980---85 G & 1980---87 P MODELS

1. Remove steering wheel as outlined previously.

2. Remove cancelling cam and spring, then the instrument panel trim plate, if equipped.

3. Disconnect turn signal switch wiring harness at half moon connector.

4. Pry wiring harness protector from column retaining slots, Fig. 3.

5. Mark location of each wire in half moon connector, then disconnect wires from connector using tool J-22727 or equivalent, Fig. 4.

6. Remove turn signal lever screw and lever.

7. Push hazard warning knob inward, then unscrew knob from plunger.

8. On tilt column models:

a. If equipped with automatic transmission, remove PRNDL dial screws, then the dial and indicator needle. Remove cap and dial bulb from

housing cover.

b. Unscrew, then remove tilt release lever.

c. Using tool J-22708 or equivalent, remove turn signal housing cover from housing as shown, Fig. 5.

9. On all models, remove turn signal switch mounting screws, then carefully remove switch assembly from column by guiding wiring harness through opening in shift lever housing.

10. Reverse procedure to install.

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-90	Barometric, Manifold Absolute	3.8-5.5 @ 0-1000 3.6-5.3 @ 1000-200 3.5-5.1 @ 2000-300 3.3-5.0 @ 3000-400 3.2-4.8 @ 4000-500 3.0-4.6 @ 5000-600 2.9-4.5 @ 6000-700 2.5-4.3 @ 7000-

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-88	Vacuum	.50-.64 @ ign. on 1.7-3.0*

* 10 in./250 mm applied to unit.

Absolute Pressure Sensor: Specifications

MANIFOLD ABSOLUTE, VACUUM AND BAROMETRIC PRESSURE SENSORS

Engines may use one, or a combination of these sensors. All sensors appear the same. Manifold Absolute Pressure sensors have a vacuum line connected between the unit and manifold vacuum. On Barometric Pressure sensors, the line is not used and the connector is either open or has a filter installed over it. Pressure sensors also have a vacuum line between the sensor and intake manifold and only appear on carburetted models.

Barometric Pressure Sensors: Measure voltage with ignition on and engine off.

Manifold Absolute Pressure Sensors: Measure voltage with ignition on and engine off. Start engine and apply 10 in./ 250 mm Hg to unit, voltage should be 1.2-2.3 volts less.

Pressure Sensors: Measure voltage as indicated.

Absolute Pressure Sensor: Description and Operation

The barometric pressure sensor senses changes in barometric pressure and provides this information, through an electrical signal, to the ECM. The sensor produces a voltage signal of 3.5 - 4 volts to indicate barometric pressure. The voltage increases in proportion to increases in altitude (decreases in barometric pressure). This sensor is normally used with the MAP sensor.

Absolute Pressure Sensor: Service and Repair

The MAP and Vacuum sensors are accessible through the engine compartment. The BARO sensor may be located either in the engine compartment or strapped to the ECM harness under the dash panel.

Other than checking for loose hoses and electrical connections, the only service required of these sensors is replacement should diagnosis show any sensors to be faulty.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

The coolant temperature sensor supplies coolant temperature information to the ECM. It is mounted in the engine coolant stream and has high resistance when the engine is cold and low resistance when the engine is warm. The ECM receives this information and controls the various systems that are dependent on temperature for proper operation.

Coolant Temperature Sensor/Switch (For Computer): Service and Repair

1. Disconnect electrical connector and remove sensor.
2. Reverse procedure to install. Torque sensor to 72 in lbs.

Engine Speed Signal: Description and Operation

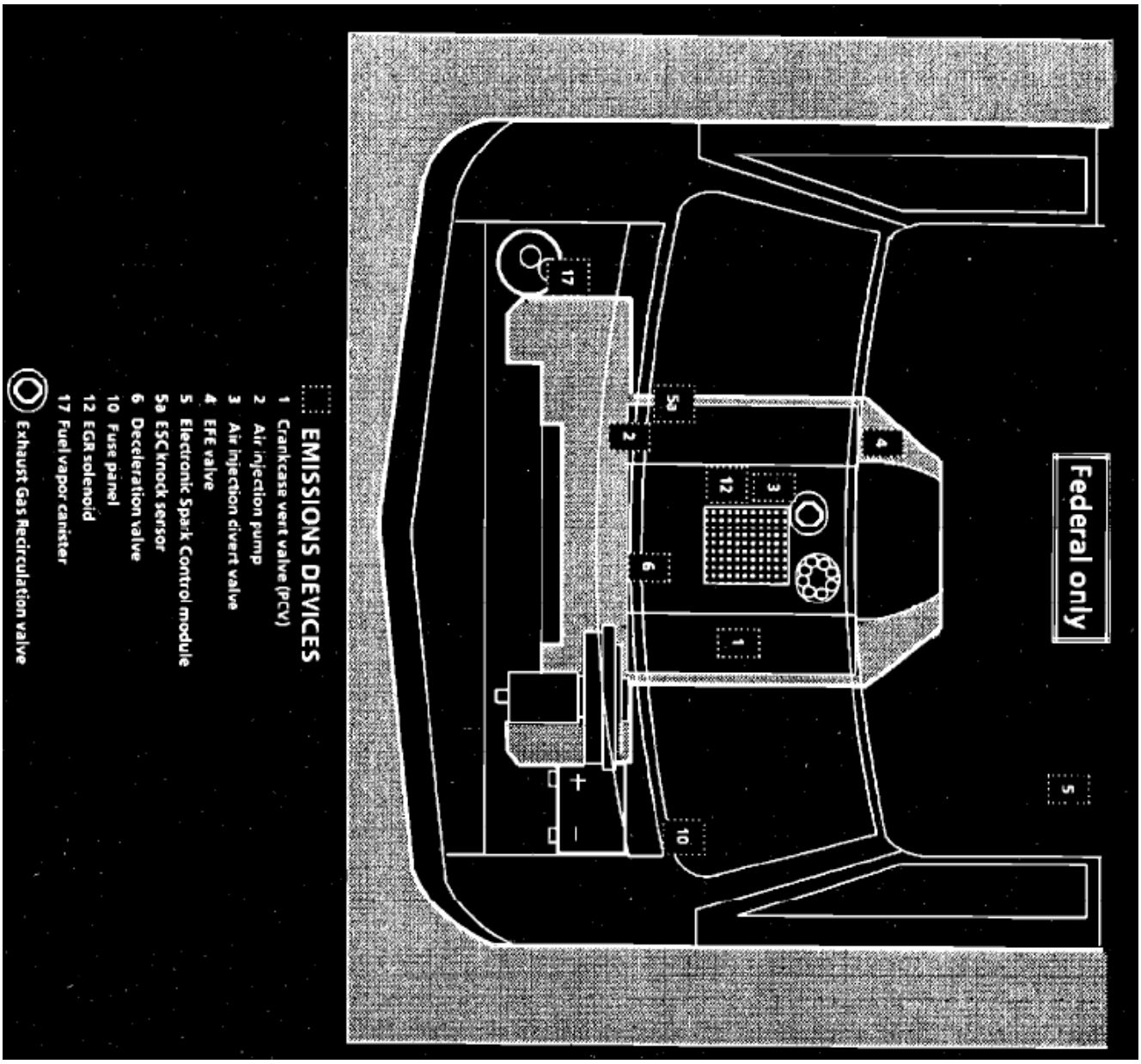
On all models with full function systems except V6-229 (1983 - 84 VIN code 9) engines, the ``R'' terminal on the 7 terminal ignition module provides reference pulses to the ECM indicating engine RPM and crankshaft position.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Powertrain Management > Sensors and Switches - Computers and Control Systems > Knock Sensor > Component Information > Locations > Electronic Spark Control Knock Sensor

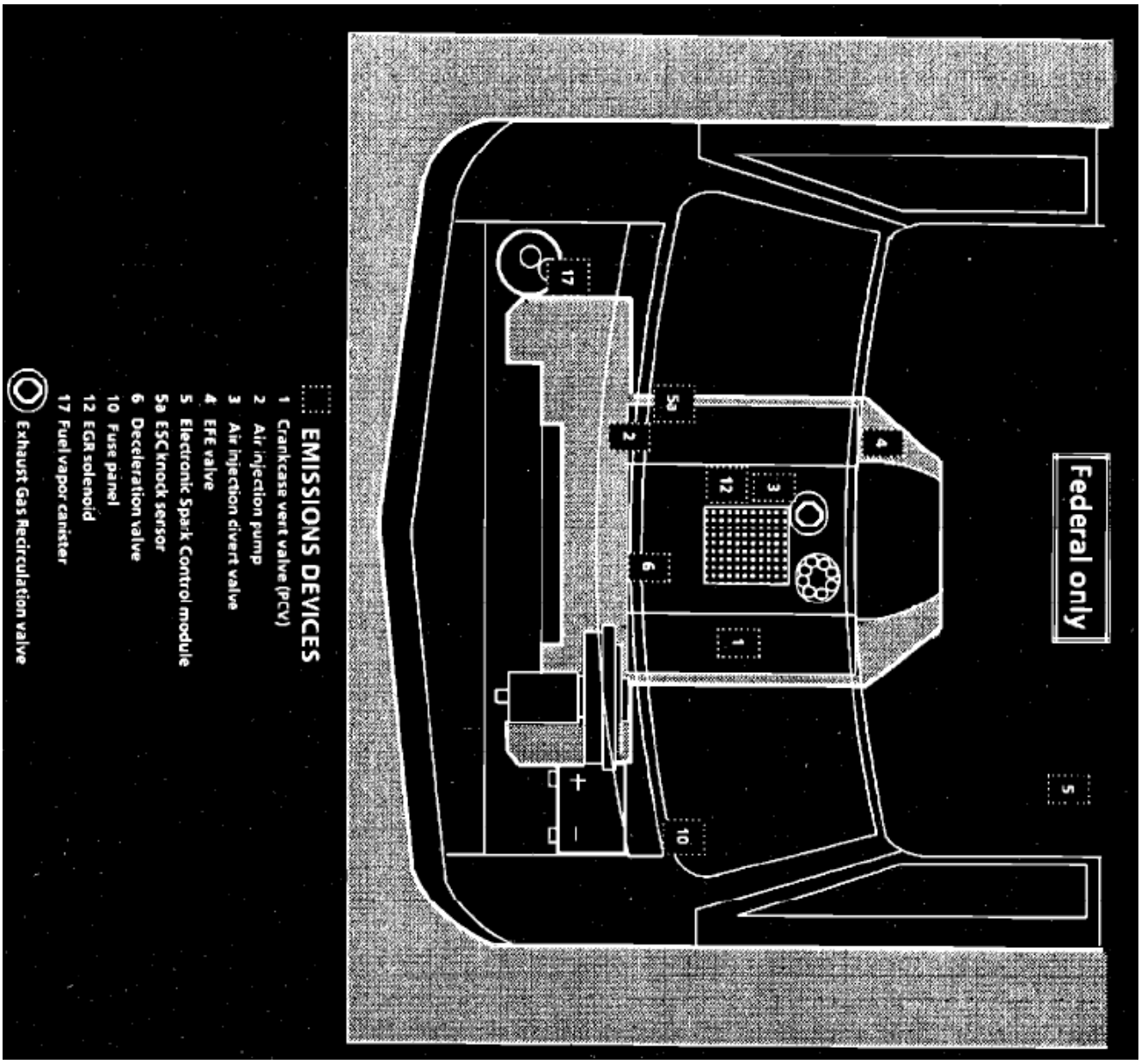


Knock Sensor: Locations Electronic Spark Control Knock Sensor

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Knock Sensor: Locations Electronic Spark Control Module

Underhood & Engine Components.

Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

Manifold Pressure/Vacuum Sensor: Technical Service Bulletins MAP - Revised Check Chart for DTC's 33, 34, 63, 64

Number: 90-199-6E

Section: 6E

Date: March 1990

Corporate Bulletin No.: 016510

Subject: REVISED CHART C-1D, CODE 33, 34, 63, 64

Model and Year: 1980-90 PASSENGER CARS AND TRUCKS

TO: ALL CHEVROLET DEALERS

This bulletin revises the Manifold Absolute Pressure (MAP) Output Check Chart C-1D and updates Code 33, Code 34, Code 63, and Code 64 in the Service Manual section on "Driveability And Emissions" (Section 6E1, 6E2, and 6E3). This information applies to all MAP Sensors on 1980-1990 vehicles with gasoline engines (except turbocharged) with green (standard) MAP sensor electrical connector insert or the solid black MAP sensor electrical connector insert.

The revised chart information:

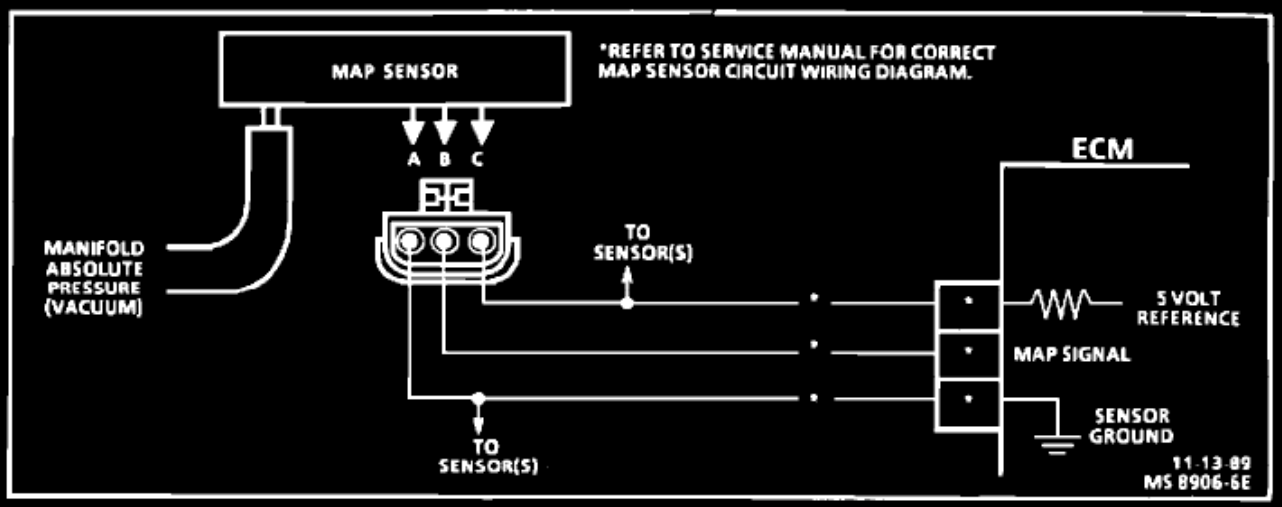


CHART C-1D

MANIFOLD ABSOLUTE PRESSURE (MAP) VOLTAGE OUTPUT CHECK

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor measures the changes in the intake manifold pressure which result from engine load (intake manifold vacuum) and rpm changes; and converts these into a voltage output. The ECM sends a 5 volt reference voltage to the MAP sensor. As the manifold pressure changed, the output voltage of the sensor also changes. By monitoring the sensor output voltage, the ECM knows the manifold pressure. A lower pressure (low voltage) output voltage will be about 1 - 2 volts at idle. While higher pressure (high voltage) output voltage will be about 4 - 4.8 at Wide Open Throttle (WOT). The MAP sensor is also used, under certain conditions, to measure barometric pressure, allowing the ECM to make adjustments for different altitudes. The ECM uses the MAP sensor to control fuel delivery and ignition timing.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

Important

- Be sure to use the same Diagnostic Test Equipment for all measurements.

1. When comparing "Scan" readings to a known good vehicle, it is important to compare vehicles that use a MAP sensor having the same color insert or having the same "Hot Stamped" number. See figures on facing page.
2. Applying 34 kPa (10" Hg) vacuum to the MAP sensor should cause the voltage to change. Subtract second reading from the first. Voltage value should be greater than 1.5 volts. Upon applying vacuum to the sensor, the change in voltage should be instantaneous. A slow voltage change indicates a faulty sensor.
3. Check vacuum hose to sensor for leaking or restriction. Be sure that no other vacuum devices are connected to the MAP hose.

NOTE: Make sure electrical connector remains securely fastened.

4. Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connection. Output changes greater than 1 volt indicate a bad connector or connection. If OK, replace sensor.

CHART C-1D

MANIFOLD ABSOLUTE PRESSURE (MAP) VOLTAGE OUTPUT CHECK

NOTE: THIS CHART ONLY APPLIES TO MAP SENSORS HAVING GREEN OR BLACK COLOR KEY INSERT (SEE BELOW).

1. • IGNITION "ON," ENGINE "OFF."
   • "SCAN" TOOL SHOULD INDICATE A MAP SENSOR VOLTAGE.
   • COMPARE THIS READING WITH THE READING OF A KNOWN GOOD VEHICLE. SEE FACING PAGE TEST DESCRIPTION, STEP 1.
   • VOLTAGE READING SHOULD BE WITHIN, ± .4 VOLT.
   IS IT?

YES

2. • DISCONNECT AND PLUG VACUUM SOURCE TO MAP SENSOR.
   • CONNECT A HAND VACUUM PUMP TO MAP SENSOR.
   • START ENGINE.
   • NOTE MAP SENSOR VOLTAGE.
   • APPLY 34 kPa (10" Hg) OF VACUUM AND NOTE VOLTAGE CHANGE. SUBTRACT SECOND READING FROM THE FIRST. VOLTAGE VALUE SHOULD BE GREATER THAN 1.5 VOLTS.
   IS IT?

YES

3. NO TROUBLE FOUND. CHECK SENSOR VACUUM SOURCE FOR LEAKAGE OR RESTRICTION. BE SURE THIS SOURCE SUPPLIES VACUUM TO MAP SENSOR ONLY.

NO

REPLACE SENSOR.

NO

4. CHECK SENSOR CONNECTION. IF OK, REPLACE SENSOR.

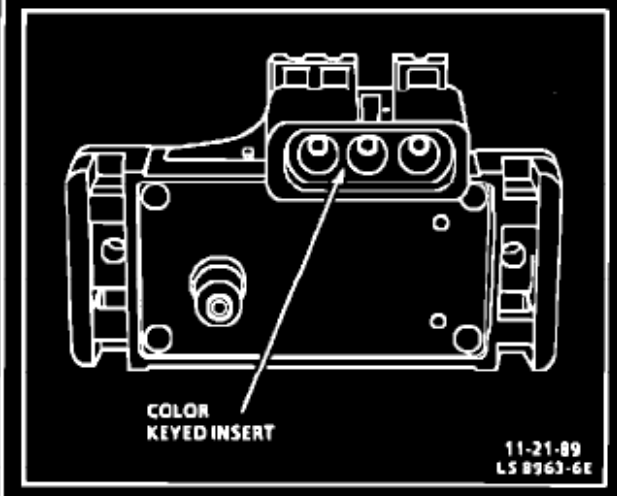


Figure 1 - Color Key Insert

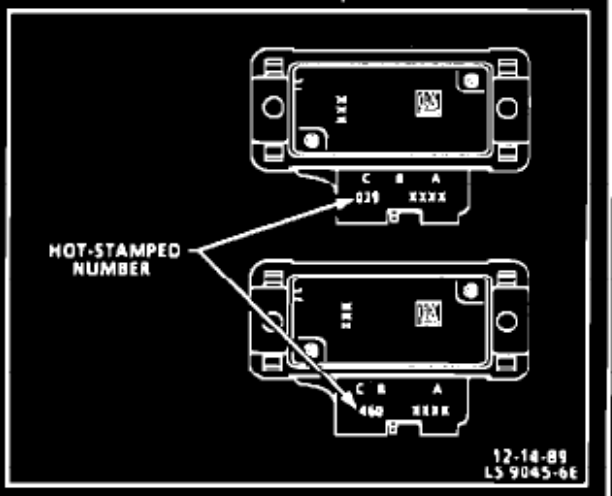


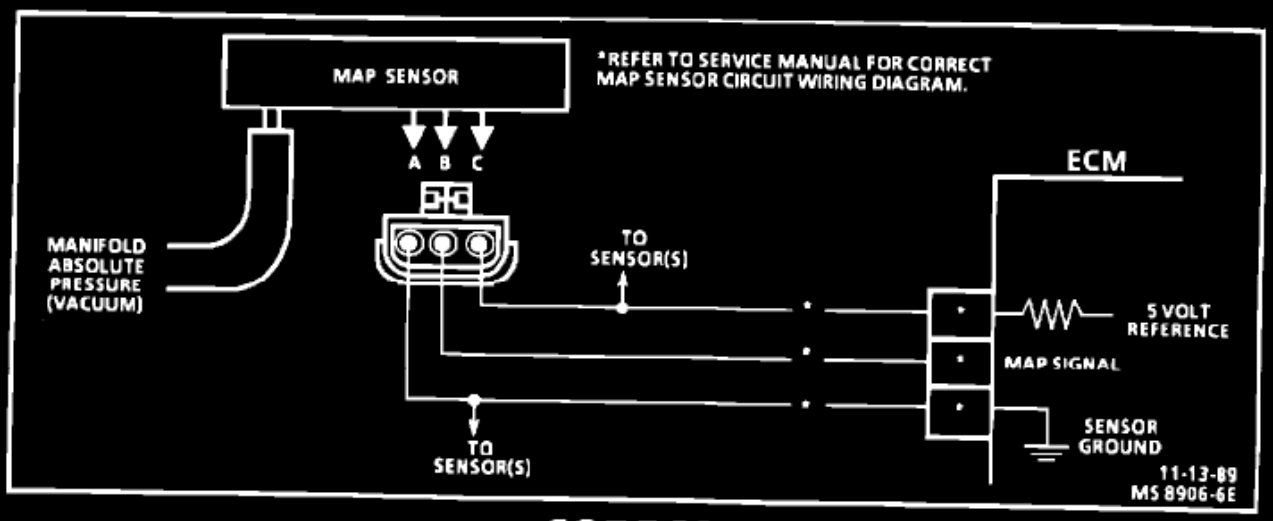
Figure 2 - Hot-Stamped Number

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "SERVICE ENGINE SOON" LIGHT.

2-28-90
• 753162-6E

- Diagnostic Chart C-1D.

The updated chart information:



CODE 33

MANIFOLD ABSOLUTE PRESSURE (MAP) OUTPUT CHECK
(SIGNAL VOLTAGE HIGH - LOW VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. This step will determine if Code 33 is the result of a hard failure or an intermittent condition.
   A Code 33 will set under the following conditions:
   - MAP signal voltage is too high (low vacuum).
   - TPS less than 2%.
   - These conditions exist longer than 5 seconds.
2. This step simulates conditions for a Code 34. If the ECM recognizes the change, the ECM and CKT 416 and CKT 432 are OK. If CKT 469 is open, there may also be a stored Code 23.

Diagnostic Aids:

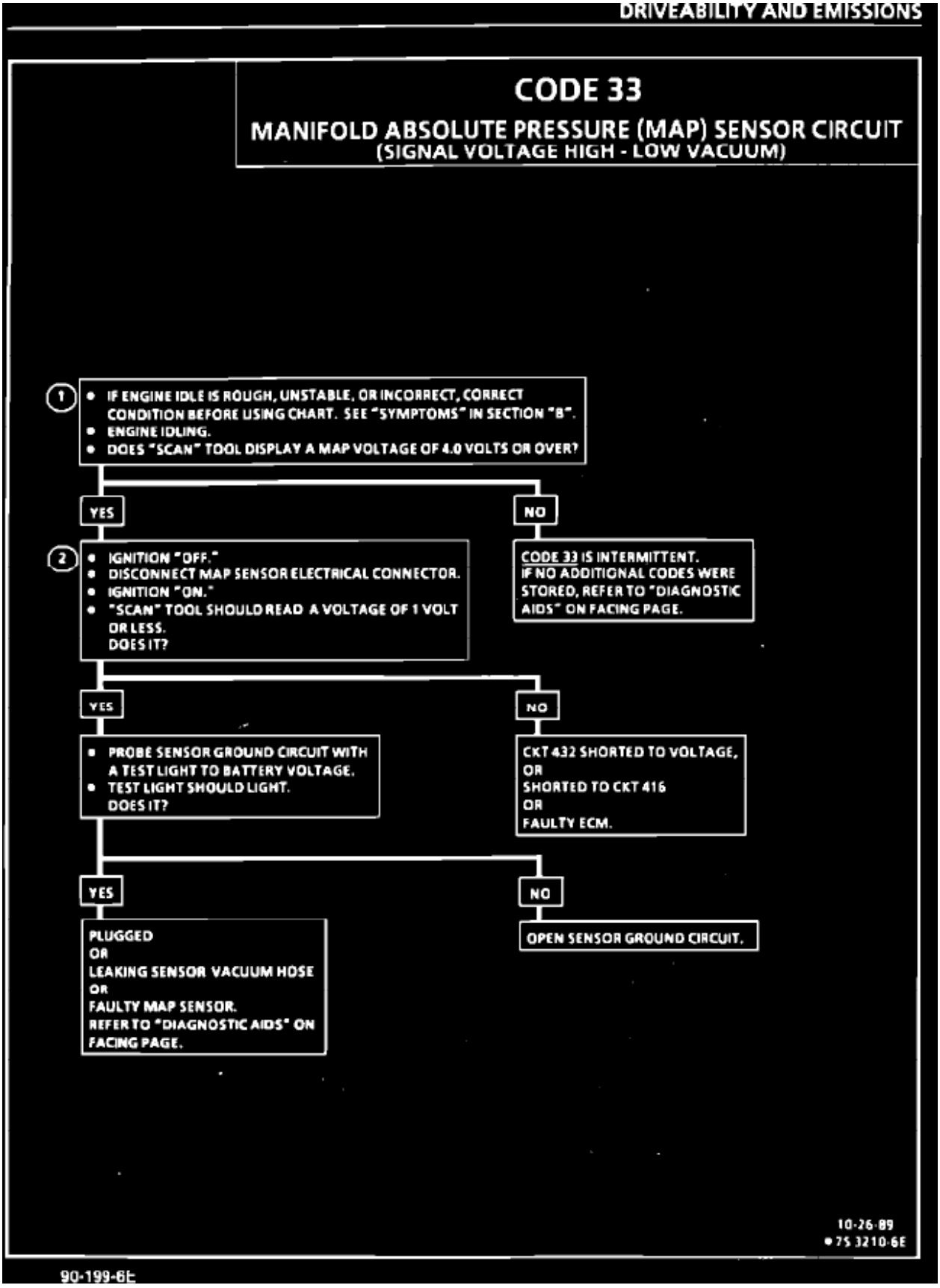
With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volt.

A Code 33 will result if CKT 469 is open or if CKT 432 is shorted to voltage or to CKT 416.

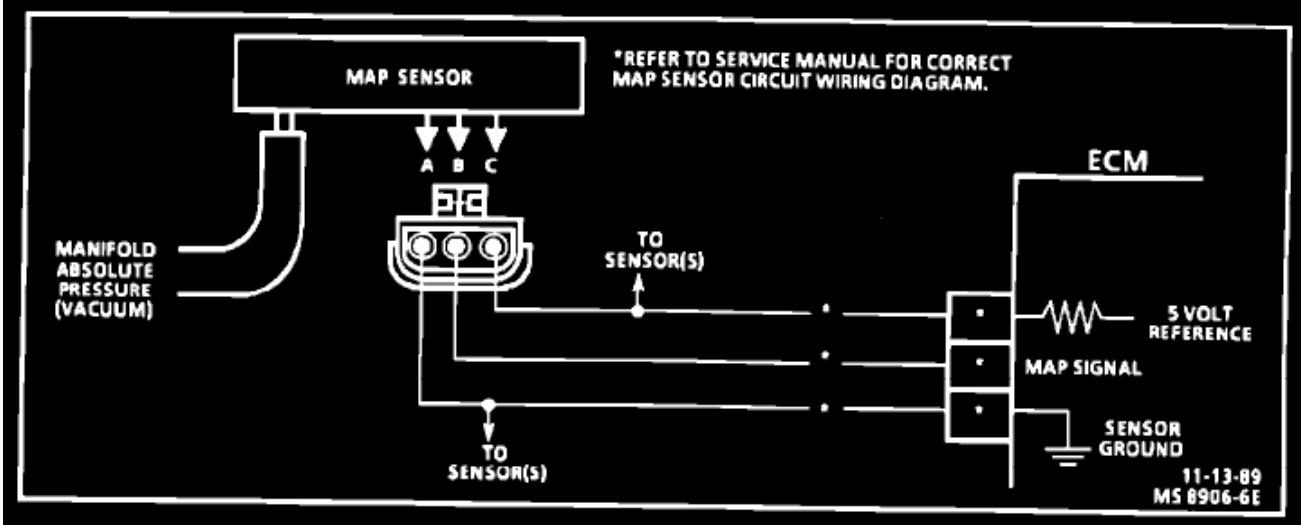
If Code 33 is intermittent, refer to Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.



- Diagnostic Chart Code 33.



CODE 34

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. This step determines if Code 34 is the result of a hard failure or an intermittent condition. A Code 34 will set when MAP signal voltage is too low and the ignition is "ON."
2. Jumpering harness terminals "B" to "C" (5 volts to signal circuit) will determine if the sensor is at fault, or if there is a problem with the ECM or wiring.
3. The "Scan" tool may not display 5 volts. The important thing is that the ECM recognizes the voltage as more than 4 volts, indicating that the ECM and CKT 432 are OK.

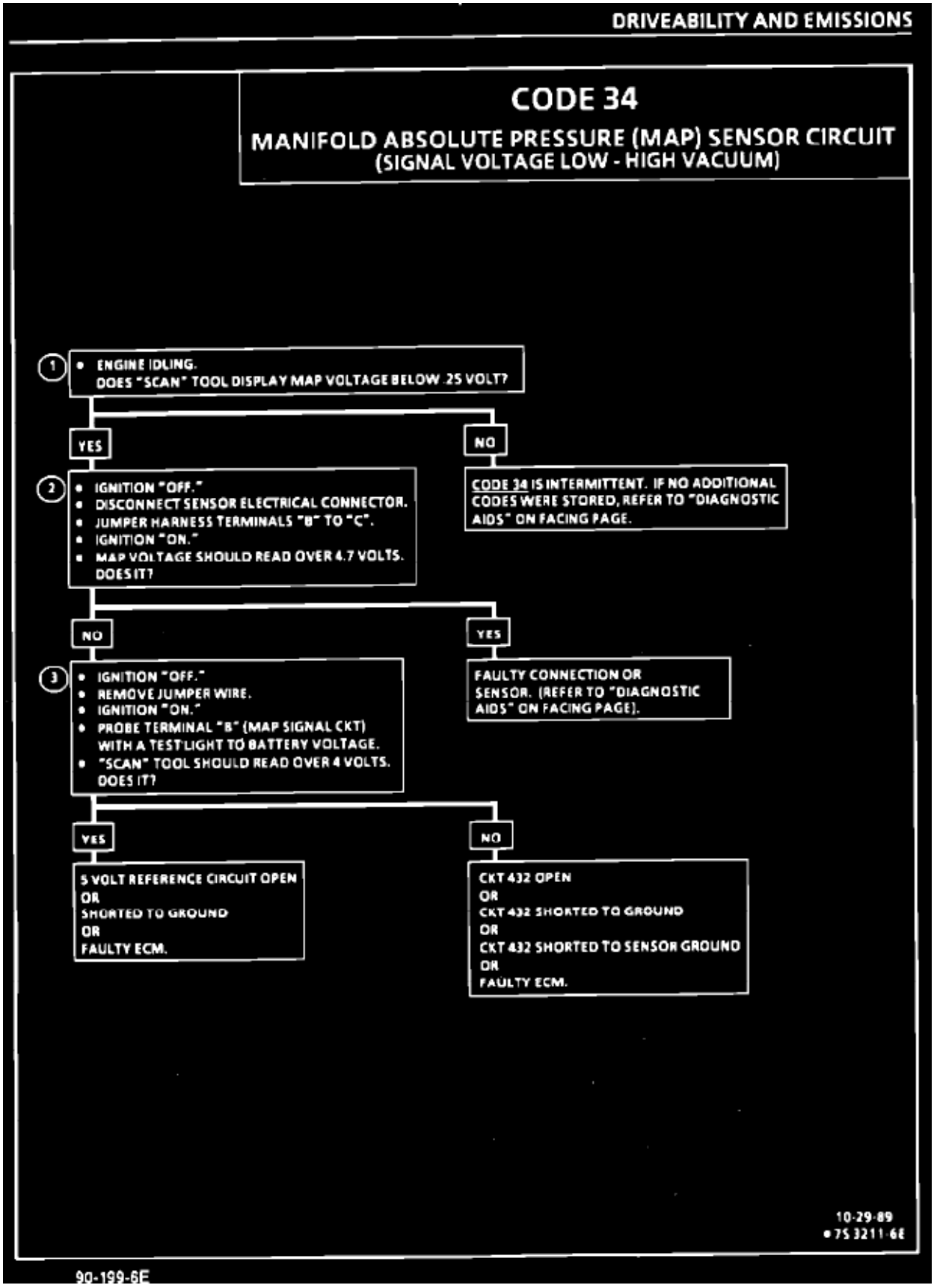
Diagnostic Aids:

An intermittent open in CKT 432 or CKT 416 will result in a Code 34. With the ignition "ON" and the engine "OFF," the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude.

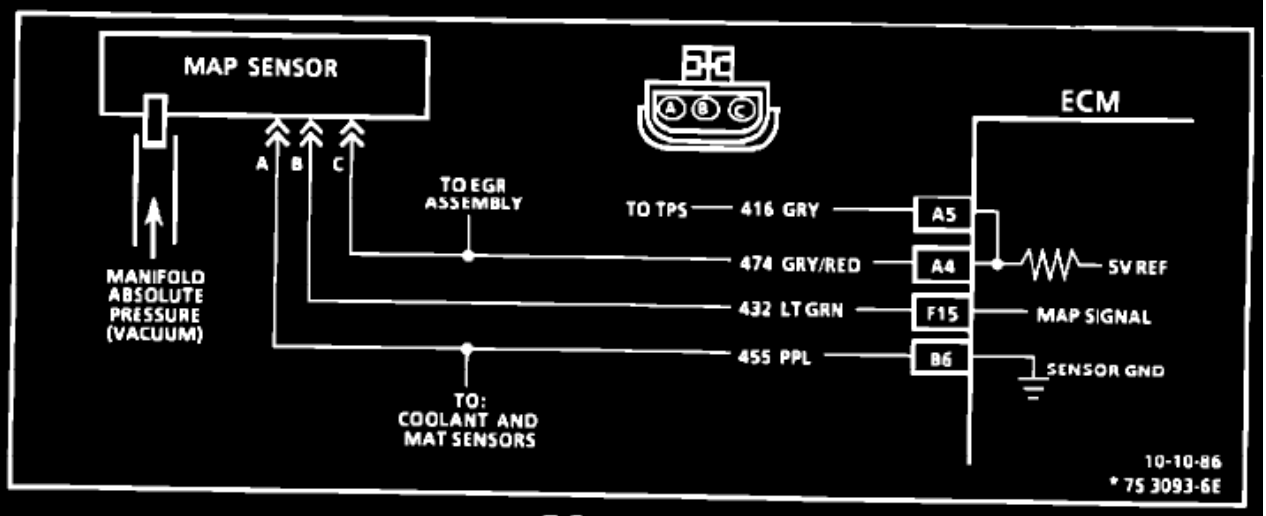
Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volts. Also CHART C-1D can be used to test the MAP sensor. Refer to "Intermittents" in Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor By hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.



- Diagnostic Chart Code 34.



CODE 63

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE HIGH - LOW VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 63 will set when:
   - Engine running.
   - Manifold pressure greater than 75.3 kPa (A/C "OFF") 81.2 kPa (A/C "ON").
   - Throttle angle less than 2%.
   - Conditions met for 2 seconds.

   Engine misfire or a low unstable idle may set Code 63.
2. With the MAP sensor disconnected, the ECM should see a low voltage if the ECM and wiring are OK.

Diagnostic Aids:

With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volt.

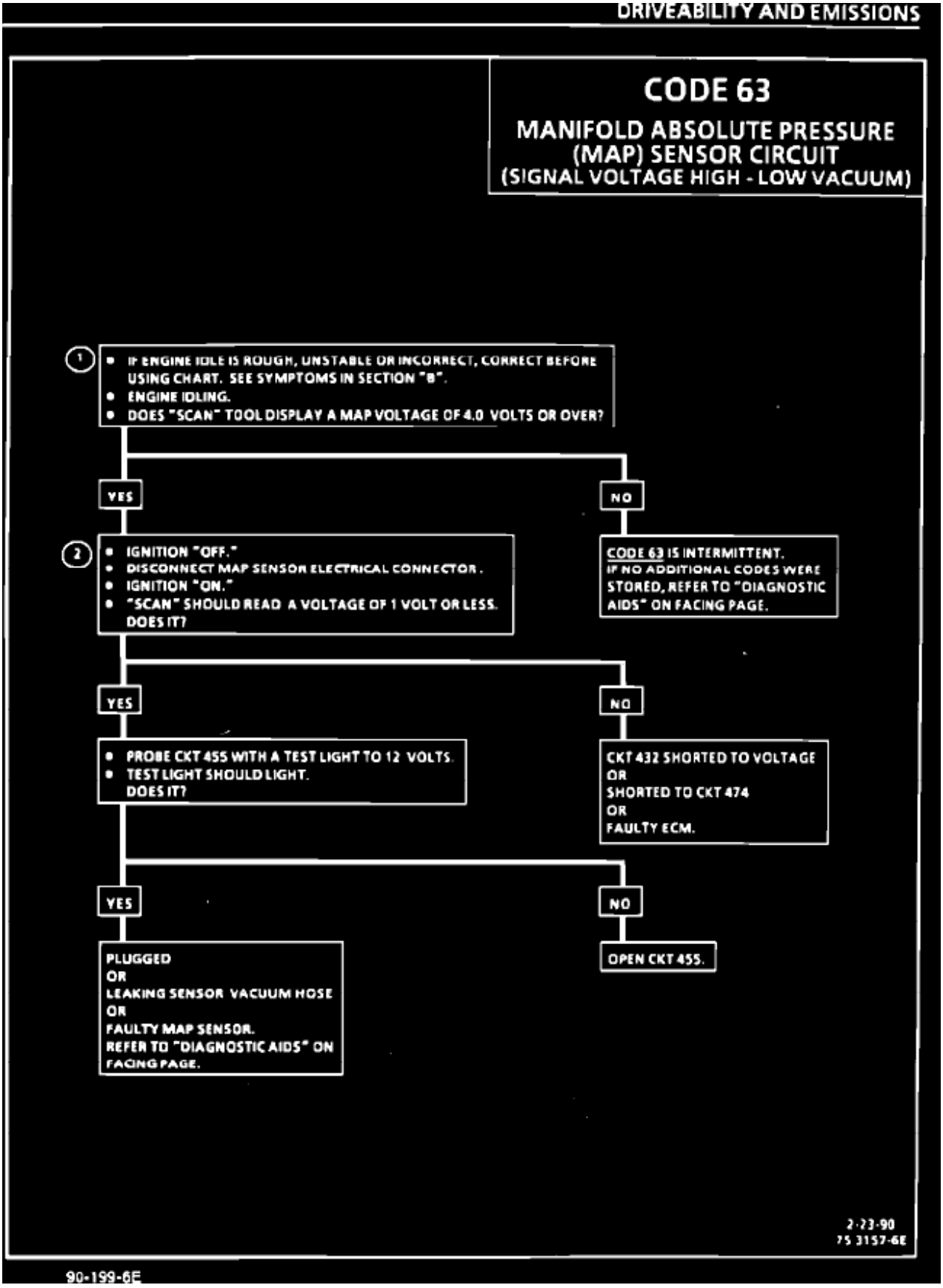
If idle is rough or unstable, refer to symptoms in Section "B" for items which can cause an unstable idle.

An open in CKT 455 or the connection will result in a Code 63.

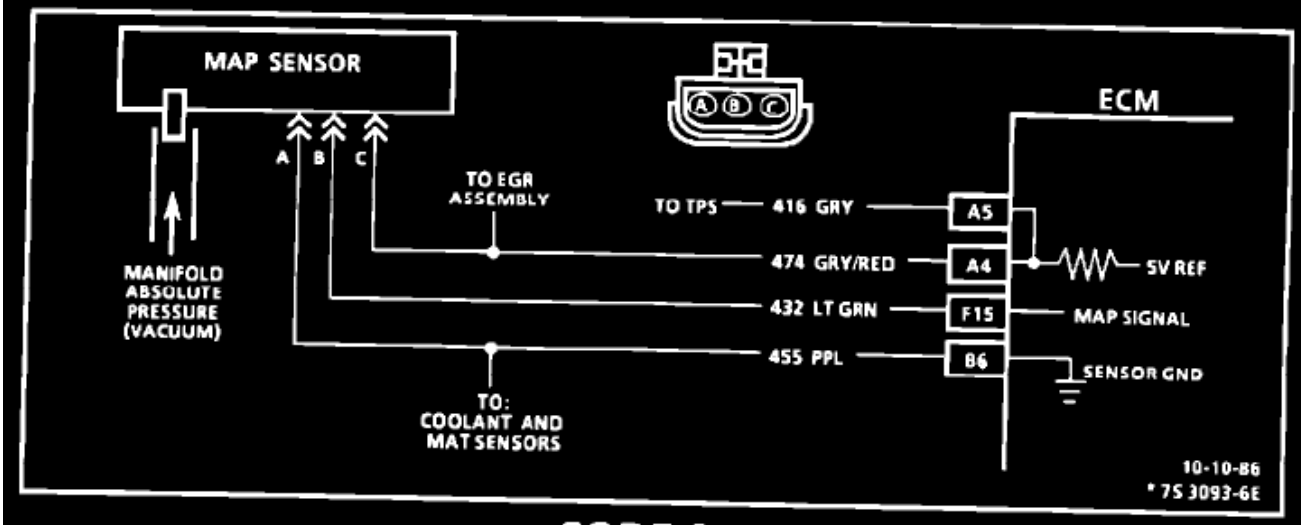
NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.

90-199-6E



- Diagnostic Chart Code 63.



CODE 64

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 64 will set if:
   - Engine rpm less than 600.
   - Manifold pressure reading less than 13 kPa.
   - Conditions met for 1 second.

   or
   - Engine rpm greater than 600.
   - Throttle angle over 20%.
   - Manifold pressure less than 13 kPa.
   - Conditions met for 1 second.
2. This test to see if the sensor is at fault for the low voltage, or if there is an ECM or wiring problem.
3. This simulates a high signal voltage to check for an open in CKT 432. If the test light is bright during this test, CKT 432 is probably shorted to ground. If "Scan" reads over 4 volts at this test, CKT 474 can be checked by measuring the voltage at terminal "C" (should be 5 volts).

Diagnostic Aids:

An intermittent open in CKTs 432 or 474 will result in a Code 64.

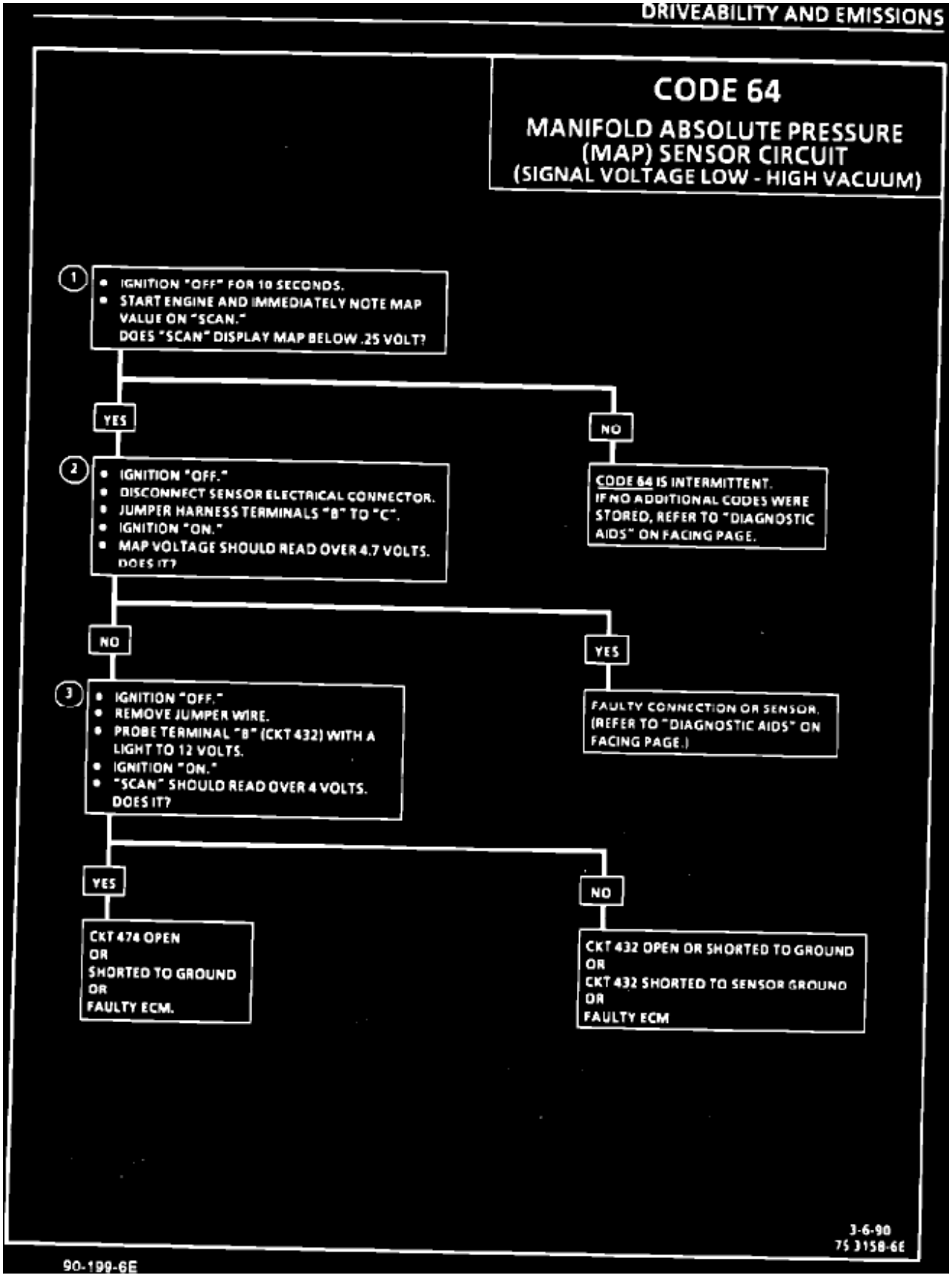
With the ignition "ON" and the engine "OFF," the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude.

Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volts. Also CHART C-1D can be used to test the MAP sensor. Refer to "Intermittents" in Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor By hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.

90-199-6E



- Diagnostic Chart Code 64.

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-90	Barometric, Manifold Absolute	3.8-5.5 @ 0-1000 3.6-5.3 @ 1000-200 3.5-5.1 @ 2000-300 3.3-5.0 @ 3000-400 3.2-4.8 @ 4000-500 3.0-4.6 @ 5000-600 2.9-4.5 @ 6000-700 2.5-4.3 @ 7000-

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-88	Vacuum	.50-.64 @ ign. on 1.7-3.0*

* 10 in./250 mm applied to unit.

Manifold Pressure/Vacuum Sensor: Specifications

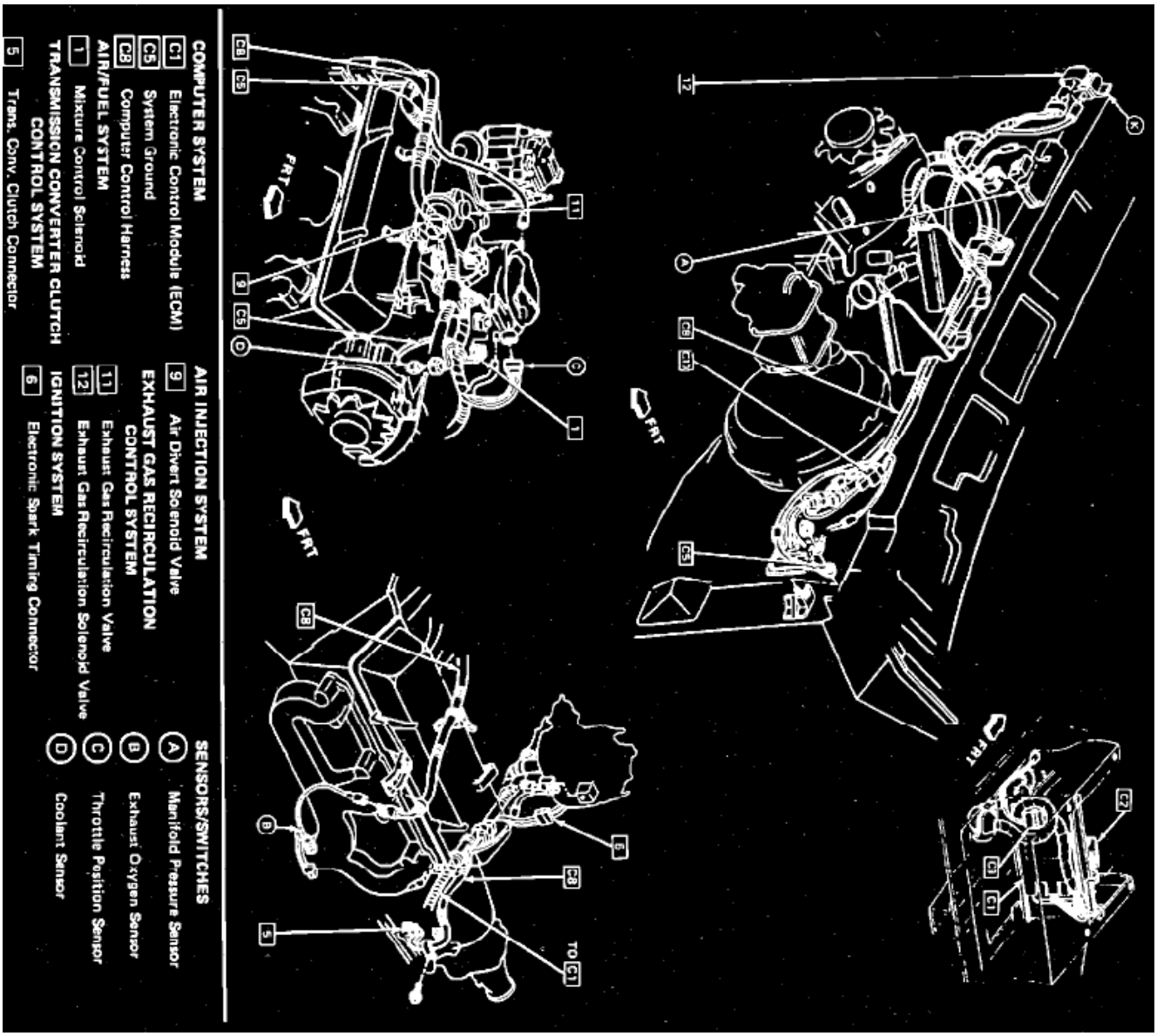
MANIFOLD ABSOLUTE, VACUUM AND BAROMETRIC PRESSURE SENSORS

Engines may use one, or a combination of these sensors. All sensors appear the same. Manifold Absolute Pressure sensors have a vacuum line connected between the unit and manifold vacuum. On Barometric Pressure sensors, the line is not used and the connector is either open or has a filter installed over it. Pressure sensors also have a vacuum line between the sensor and intake manifold and only appear on carburetted models.

Barometric Pressure Sensors: Measure voltage with ignition on and engine off.

Manifold Absolute Pressure Sensors: Measure voltage with ignition on and engine off. Start engine and apply 10 in./ 250 mm Hg to unit, voltage should be 1.2-2.3 volts less.

Pressure Sensors: Measure voltage as indicated.

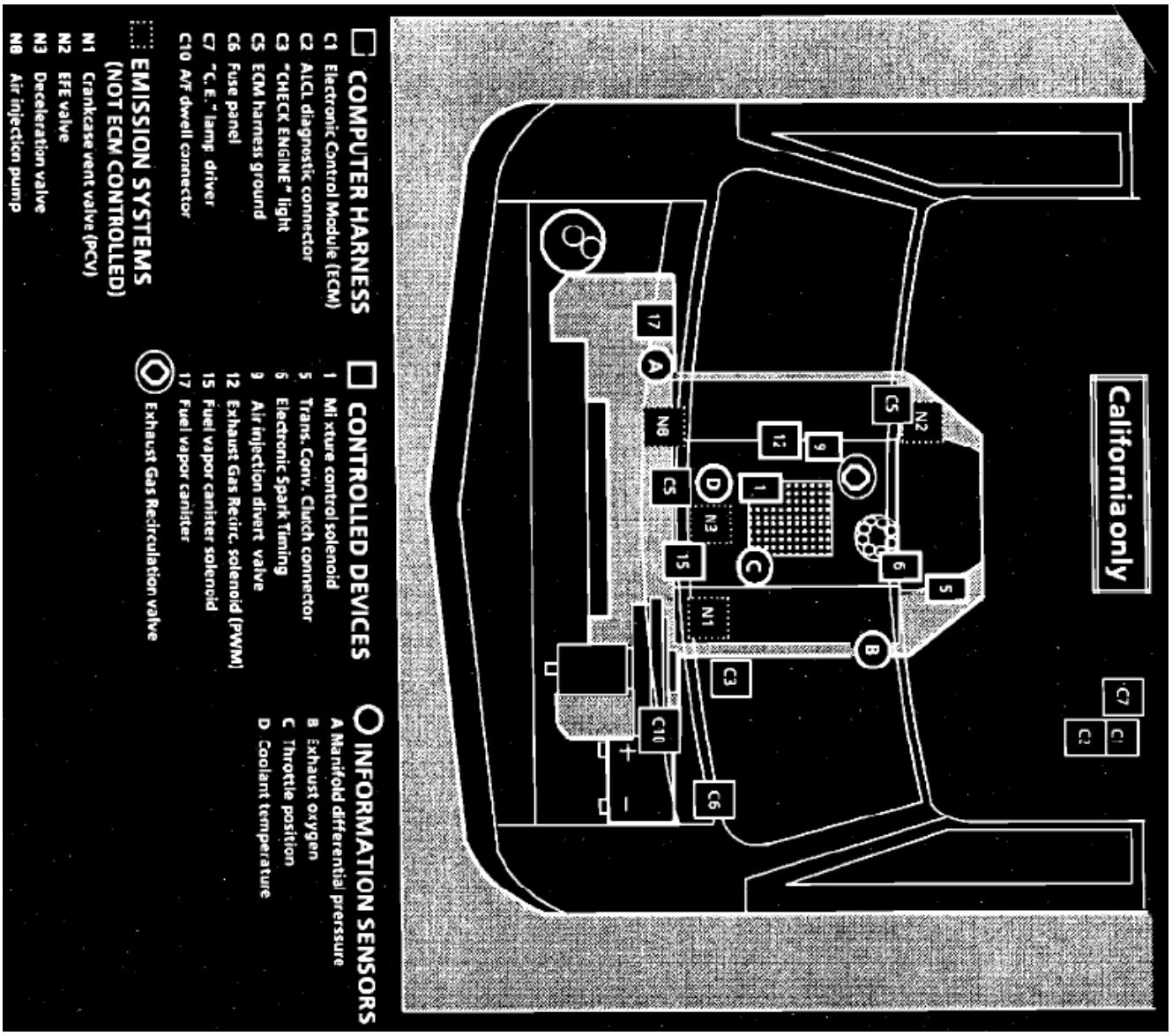


Manifold Pressure/Vacuum Sensor: Locations Manifold Absolute Pressure (MAP) Sensor

Engine Components.

Center Of Dash Panel

Applicable to: 1985 G Series w/V8



Manifold Pressure/Vacuum Sensor: Locations Manifold Differential Pressure Sensor

Underhood & Engine Components.

RH Side Of Dash Panel

Applicable to: 1985 G Series w/5.0L & 5.7L California

Manifold Pressure/Vacuum Sensor: Service and Repair

The MAP and Vacuum sensors are accessible through the engine compartment. The BARO sensor may be located either in the engine compartment or strapped to the ECM harness under the dash panel.

Other than checking for loose hoses and electrical connections, the only service required of these sensors is replacement should diagnosis show any sensors to be faulty.

Oxygen Sensor: Technical Service Bulletins RTV Sealants - Use on Engines With Oxygen Sensors

NUMBER: 86-B-28

GROUP: 6 - Gasoline Engine

DATE: March, 1986

SUBJECT: RTV (AEROBIC SEALANTS) AND ANAEROBIC SEALANTS FOR ENGINES EQUIPPED WITH OXYGEN SENSORS

MODELS: 1981-86 C, K, G, S, T, M, AND CABALLEROS WITH YF5 CALIFORNIA EMISSIONS
1985-86 S, T, AND M WITH 2.5L EFI AND NA

Incorrect usage of RTV sealants (cure in the presence of air) may cause damage to vehicle components such as oxygen sensors. This is caused by silica particles collecting on the oxygen sensor and contaminating the sensor. The correct application for RTV sealants is listed in the WDDGM parts book. The correct RTV sealants to use on engines in GMC Trucks are part numbers 1052914 or 1052917 (black) or part number 1052915 (clear). Red RTV sealant, part number 1052366, is for use on rear axle differential covers only, as it contains silica. Anaerobic sealers (cure without the presence of air) part numbers 1052756, 1052943, and 1052942 are also used to seal the rear main bearing cap to the block on engines used in GMC Trucks. See the chart below for a description of General Motors service approved RTV silicone and anaerobic sealers.

GENERAL MOTORS SERVICE APPROVED RTV SILICONE SEALANTS

Part Name Color Part Number Size Application

GMS (Type B) Black 1052914 300 ml. Caulker All Light

1052917 3 oz. Tube Duty Engines Except 2.5L

GMS (Type A) Clear 1052915 300 ml. Caulker 2.5L 4 Cylinder

GMS Red 1052366 3 oz. Tube Rear Axle Usage Only

GENERAL MOTORS SERVICE APPROVED ANAEROBIC SEALANTS

Part Name Part Number Size Application

Loctite (R) Gasket Maker 1052942 6 ml. Engine Anaerobic Applications

1052943 50 ml.

1052756 6 ml.

Loctite (R) Transmission Case Cover 1052756 6 ml. Transmission Case Covers

Sealant

Loctite (R) Trim Bonding Adhesive 1052621 4 gm. Trim, Super Glue

Loctite (R) Pipe Sealant w/Teflon 1052080 50 ml. Pipe Sealant

Loctite (R) Thread Locking Kit 1052624 10 ml. Thread Locking, Retaining Compound

Loctite (R) Inside Mirror Adhesive Kit 1052369 0.4 cc. Inside Rear View Mirror

GENERAL MOTORS OTHER APPROVED SEALANTS

Part Name Part Number Application

Gasket Sealing Compound 1050026 Gasket Sealing

Adhesive Caulking Kit 9636067 Windshield, Back Glass, Anywhere Urethane Based Sealer Is Required

Oxygen Sensor: Technical Service Bulletins Oxygen Sensors - Silica Contamination

Model Year: 1981

Bulletin No: 81-I-37

File In Group: 60

Number: 11

Date: Feb. 81

Subject: Silica Contamination of Oxygen Sensors and Gelation of Oil.

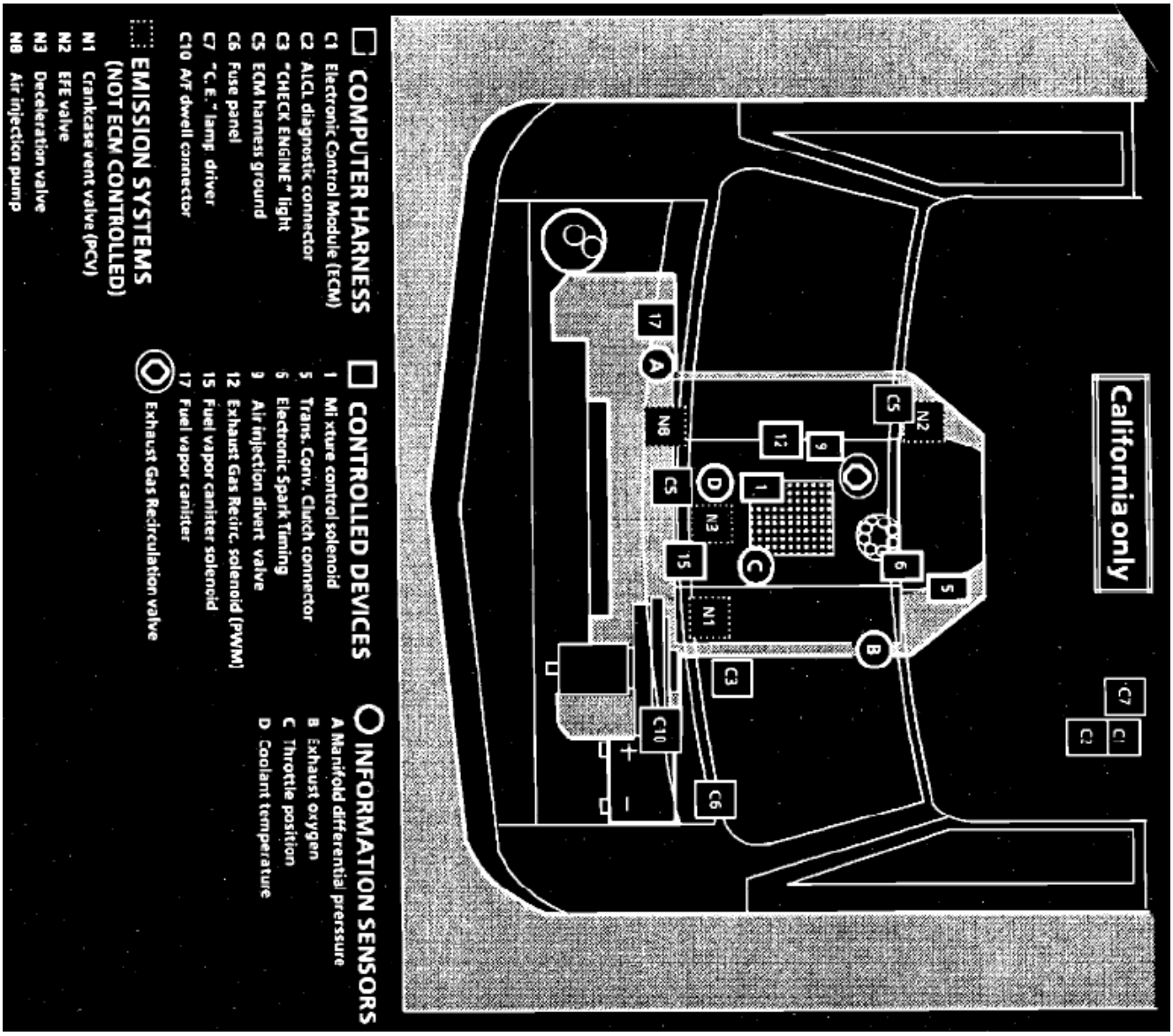
Models Affected: All

Oxygen sensor performance can deteriorate if certain RTV silicone gasket materials are used. Other RTV's when used with certain oils, may cause gelation of the oil. The degree of performance severity depends on the type of RTV and application of the engine involved.

Therefore, when repairing engines where this item is involved, it is important to use either cork composition gaskets or RTV silicone gasket material approved for such use. GMS (General Motors Sealant) or equivalent material can be used. GMS is available through GMPD with the following part numbers:

1052366 3 oz.

1052434 10.14 oz.

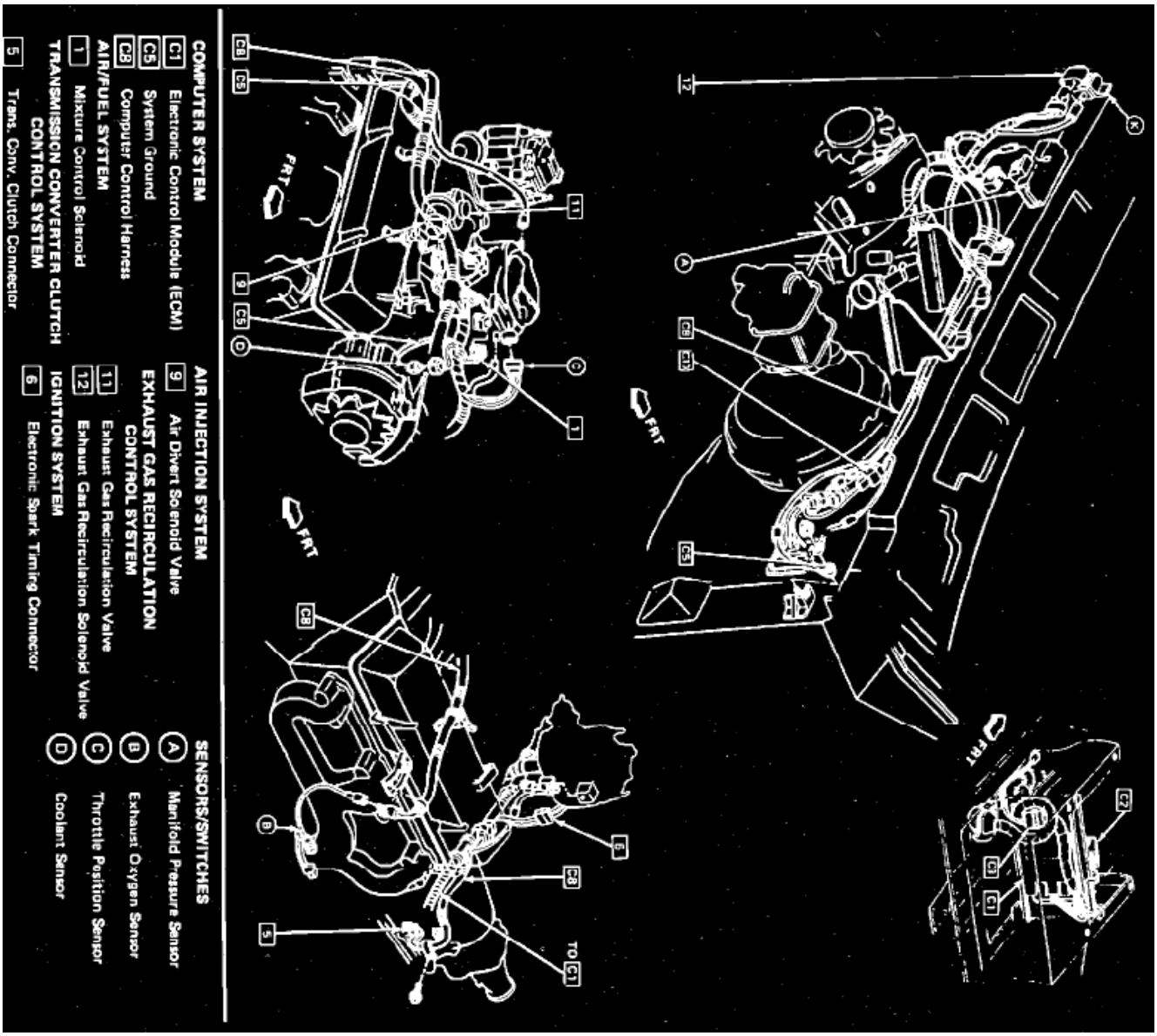


Oxygen Sensor: Locations California

Underhood & Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Oxygen Sensor: Locations Except California

Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

Oxygen Sensor: Description and Operation

The exhaust oxygen sensor is located in the exhaust system and monitors oxygen content in the exhaust gas stream. Varying concentration of oxygen in the exhaust gas causes the O2 sensor to produce a varying voltage output. By monitoring the O2 sensor output voltage, the ECM can determine the amount of oxygen in the exhaust gas and adjust the air/fuel mixture accordingly.

Rich air/fuel ratio = low oxygen content and high signal output (0.45-1.0 volt) Lean air/fuel ratio = high oxygen content and low signal output (below 0.45 volt).

Oxygen Sensor: Service and Repair

The oxygen sensor has a permanently attached pig-tail and connector. This pig-tail should not be removed, since removal will affect proper operation of oxygen sensor.

1. Disconnect electrical connector from oxygen sensor.

2. Using a suitable wrench, carefully remove sensor from exhaust manifold or pipe. The oxygen sensor may be difficult to remove when engine temperature is below 120°F. Use caution, since excessive force may damage threads in exhaust manifold or pipe.

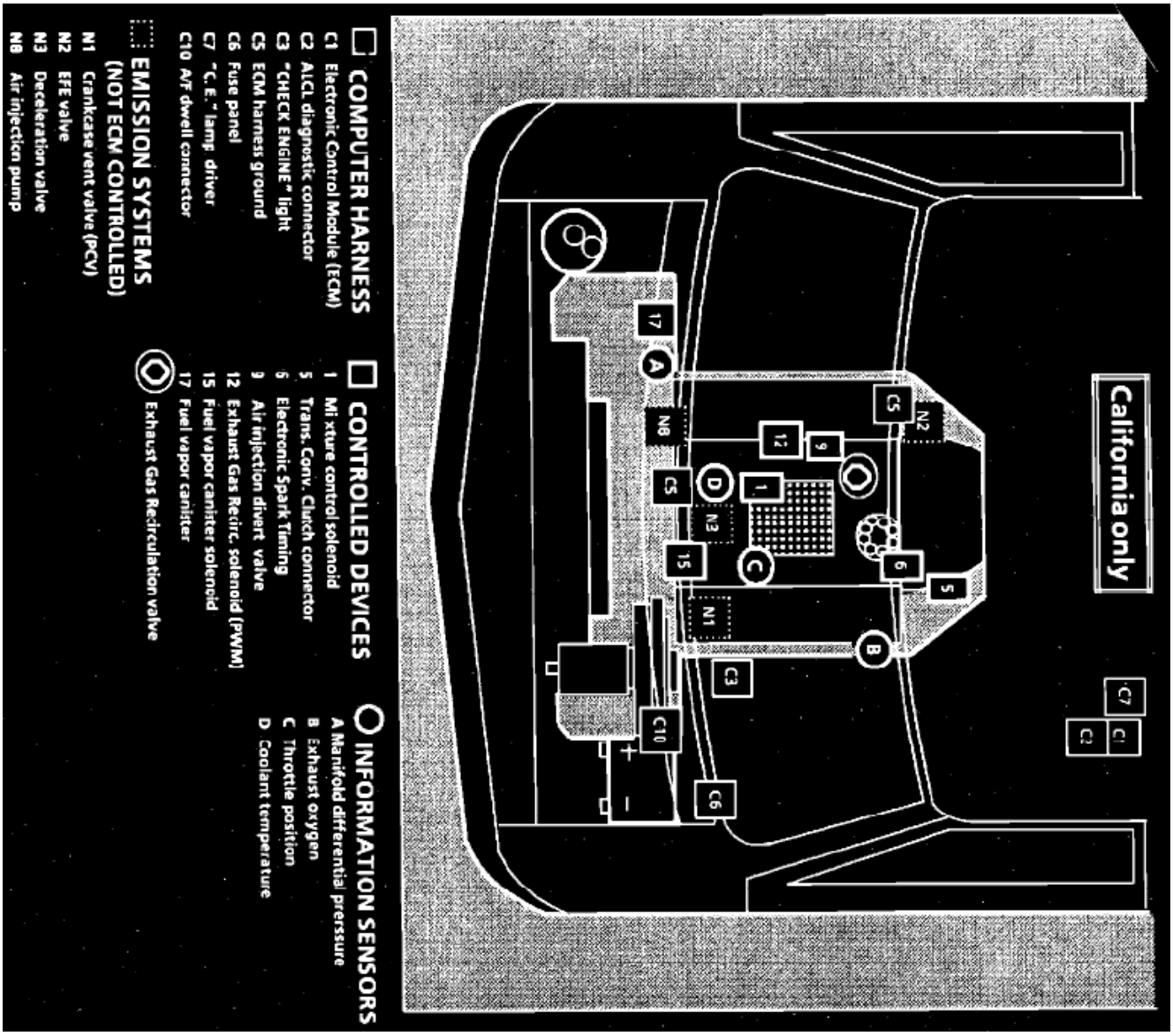
3. If new sensor is being used, install sensor into manifold or pipe.

4. If old sensor is being reused, coat threads with anti-seize compound, Part No. 5613695 or equivalent, then install into manifold or pipe.

5. Torque oxygen sensor to 30 ft. lbs., then reconnect electrical connector.

Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Fig. 16 Throttle Position Sensor Specifications

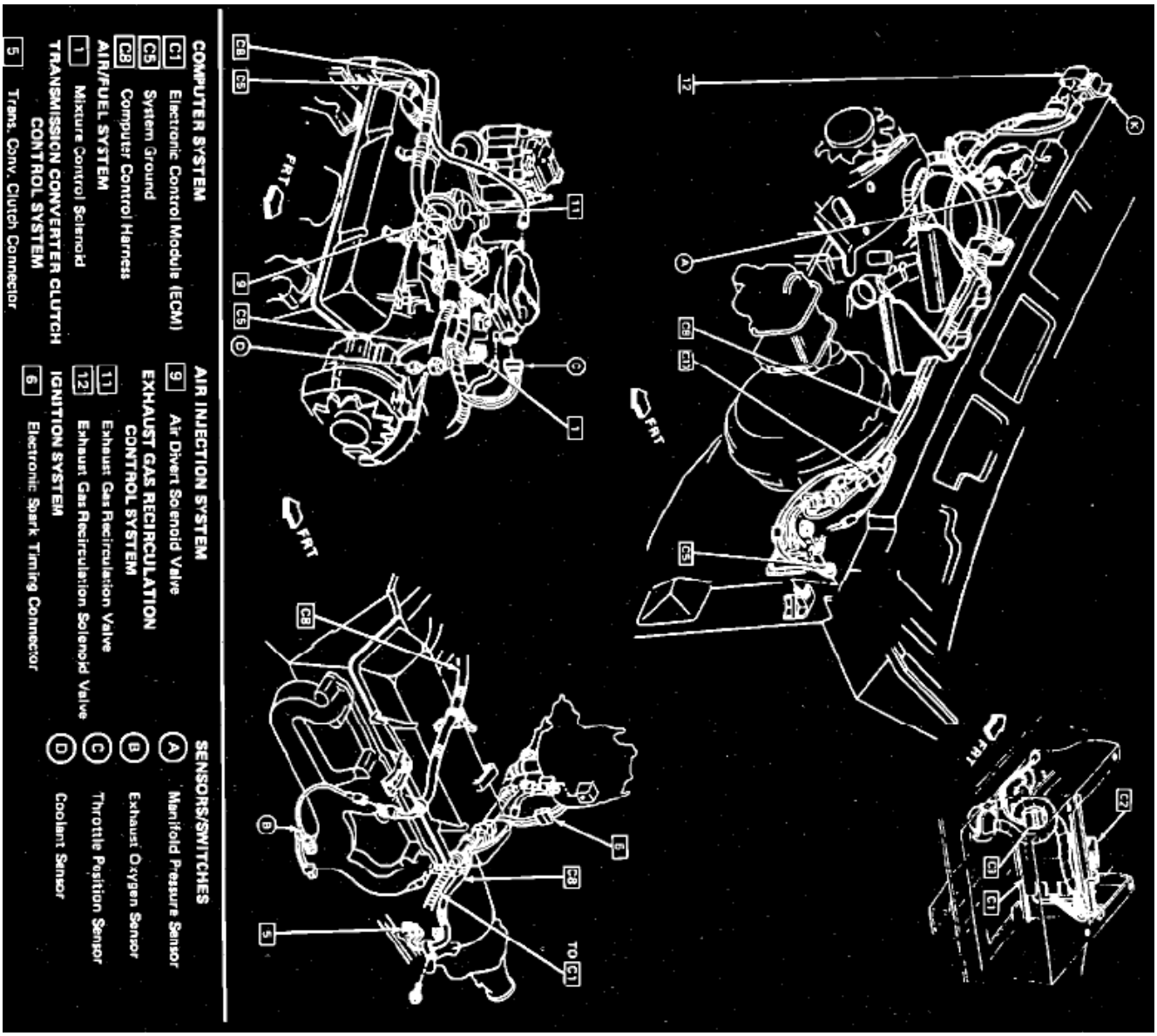


Throttle Position Sensor: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Throttle Position Sensor: Locations Except California

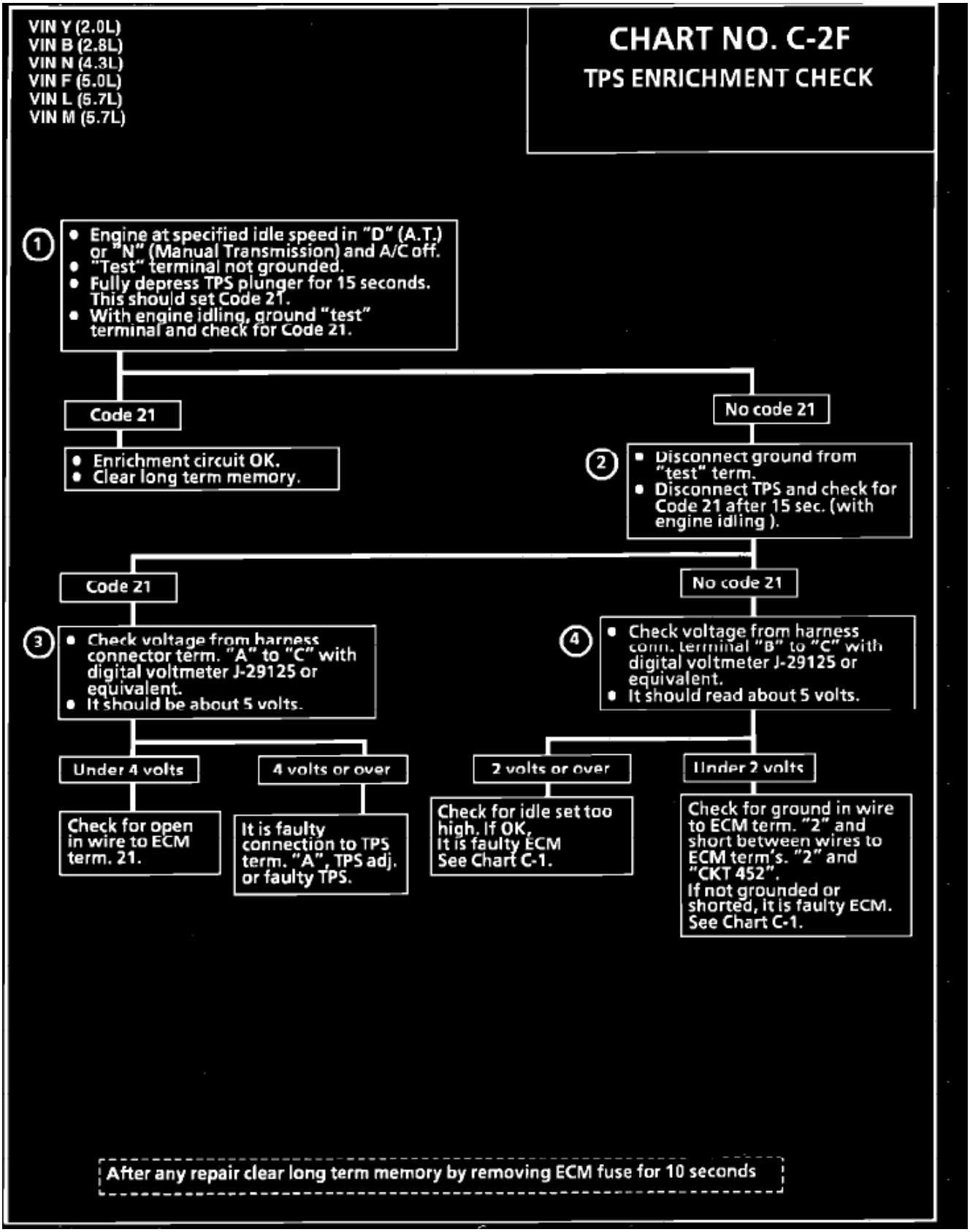
Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

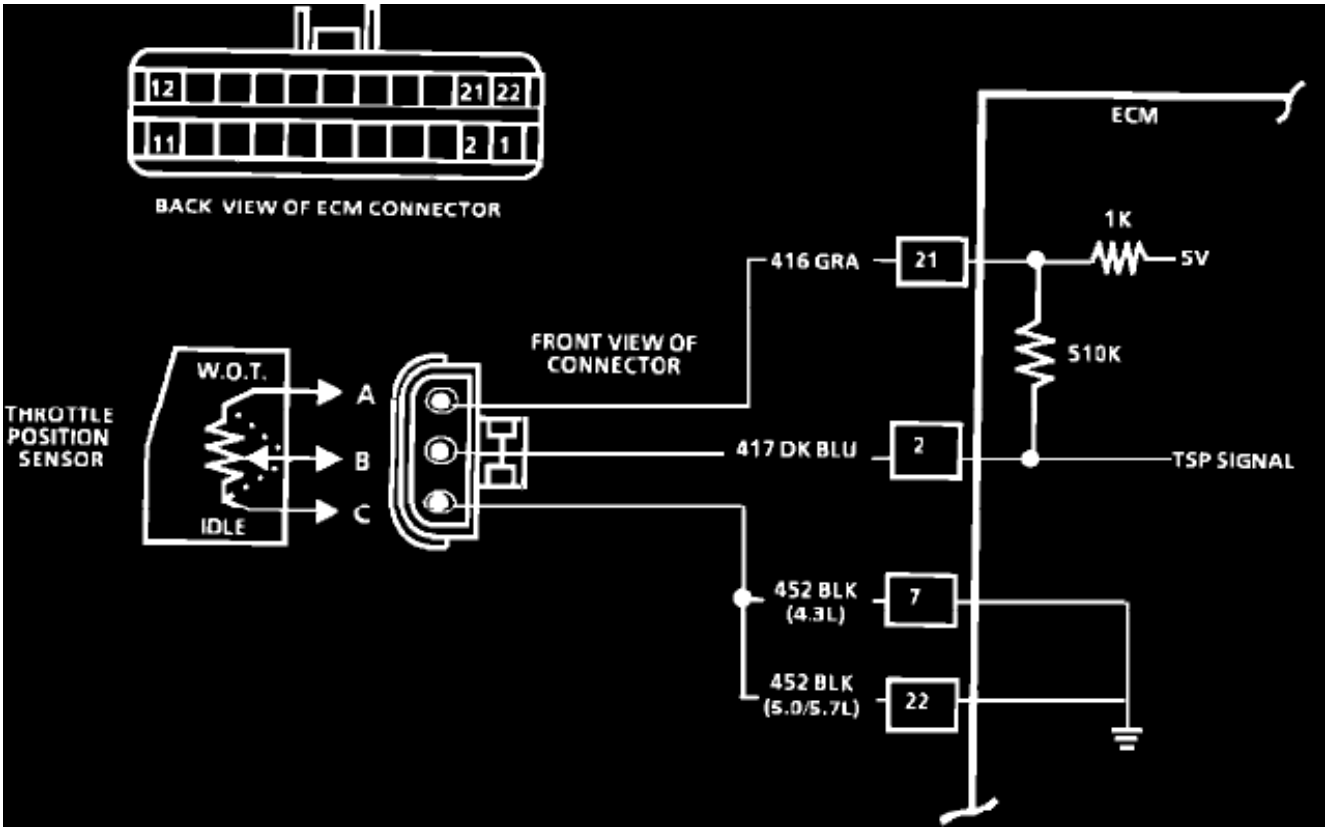
Throttle Position Sensor: Description and Operation

The TPS is mounted in the carburetor body and is moved by the accelerator pump linkage. When the throttle blades are closed, the TPS provides a low voltage (under 1 volt). This voltage signal will increase to up to 5 volts as the throttle blades are opened to wide open throttle. These voltage signals provide an indication of throttle position to the ECM.


VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART NO. C-2F
TPS ENRICHMENT CHECK
1
Engine at specified idle speed in "D" (A.T.) or "N" (Manual Transmission) and A/C off.
"Test" terminal not grounded.
Fully depress TPS plunger for 15 seconds. This should set Code 21.
With engine idling, ground "test" terminal and check for Code 21.
Code 21
Enrichment circuit OK.
Clear long term memory.
No code 21
2
Disconnect ground from "test" term.
Disconnect TPS and check for Code 21 after 15 sec. (with engine idling).
Code 21
3
Check voltage from harness connector term. "A" to "C" with digital voltmeter J-29125 or equivalent.
It should be about 5 volts.
Under 4 volts
Check for open in wire to ECM term. 21.
4 volts or over
It is faulty connection to TPS term. "A", TPS adj. or faulty TPS.
No code 21
4
Check voltage from harness conn. terminal "B" to "C" with digital voltmeter J-29125 or equivalent.
It should read about 5 volts.
2 volts or over
Check for idle set too high. If OK, It is faulty ECM See Chart C-1.
Under 2 volts
Check for ground in wire to ECM term. "2" and short between wires to ECM term's. "2" and "CKT 452". If not grounded or shorted, it is faulty ECM. See Chart C-1.
After any repair clear long term memory by removing ECM fuse for 10 seconds

Throttle Position Sensor: Testing and Inspection

Chart C-2F - TPS Enrichment Check



Wiring Diagram for Chart C-2F - TPS Enrichment Check

CHART C-2F - TPS ENRICHMENT CHECK

Test Description:

1. This step checks that the TPS will cause an ECM "Rich" command when fully depressed manually. On some vehicles, this will cause a low dwell (full rich). On others it will not.

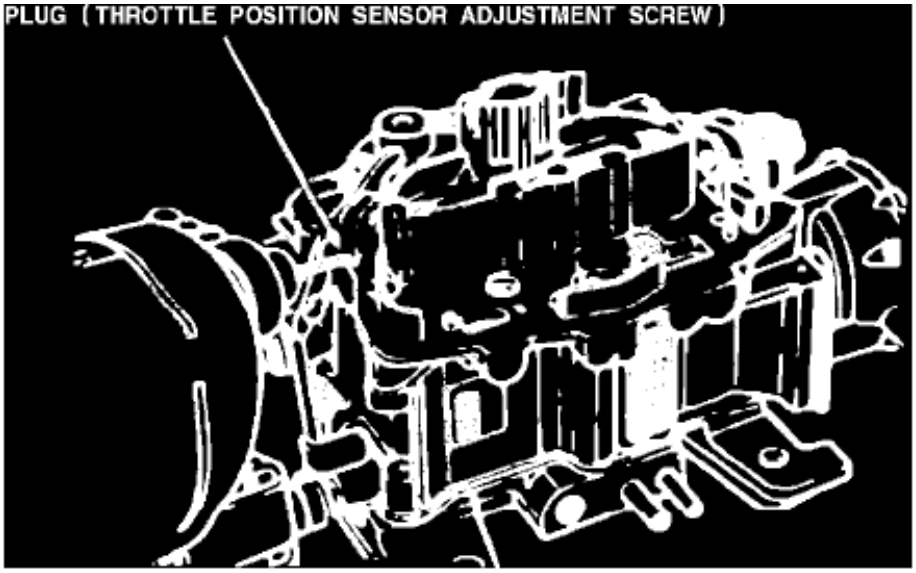
Code 21 should normally be set.

2. This step distinguishes between a faulty TPS or ECM harness/ECM.

Code 21 should normally be set, if engine RPM is not set above specifications.

3. This step checks for 5V. ref. at TPS. It should be about 5 volts. If loss of V. Ref were in the ECM, it should set Codes 21, 32 and 34 since this is the same 5V to VAC Sensor. Therefore, it must be an open in the wire.

4. This step checks for a grounded circuit. Normal circuit should read about 5 volts. Checking for grounded TPS output to Terminal "2" of ECM, or short in CKT 417 and 452 from TPS, indicates whether fault is in wiring or ECM. A voltmeter with a 10 megohms resistance must be used for an accurate reading.



Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.20	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Throttle Position Sensor: Adjustments

Fig. 15 Throttle Position Sensor Adjustment Screw Cover Removal

Fig. 16 Throttle Position Sensor Specifications

Do not remove plug sealing TPS adjustment or adjust TPS unless carburetor is overhauled or ``Computer Command Control (C3)'' system

diagnosis indicates a problem with the switch.

1. Drill a .078 (5/64) inch hole, 1/16-1/8 inch deep, in plug covering TPS adjustment, Fig. 15.

2. Thread a No. 8 sheet metal screw into hole and pry out plug using a suitable lever.

3. Remove TPS adjusting screw using tool J-28696 or equivalent.

4. Leaving electrical connector in place, connect a digital voltmeter between TPS center terminal (B) and bottom terminal (C), using jumper wires if necessary. Only a digital voltmeter with 10 megohm input impedance or higher can be used. Conventional voltmeters do not have sufficient resistance to obtain accurate readings.

5. With ignition on, engine stopped and A/C off, install TPS screw and adjust quickly to obtain specified TPS idle voltage, Fig. 16.

6. Turn ignition off and install new plug over TPS adjusting screw or seal opening with RTV sealer.

Throttle Position Sensor: Service and Repair

To replace Throttle Position Sensor it is necessary to remove the air horn assembly from the carburetor.

1. Remove or disconnect electrical connectors from M/C solenoid and TPS assembly.

2. Air horn removal:

a. Remove upper choke lever from end of choke shaft by removing attaching screw. Rotate upper choke lever to remove lever from choke link.

b. Remove choke link from lower lever inside the float bowl casting. Remove link by holding lower lever outward with small screwdriver and twisting link counter-clockwise.

c. Remove the retainer from the pump link, and remove link from lever. DO NOT remove pump lever from air horn.

d. Remove vacuum break hose from tube on float bowl.

e. Remove air horn-to-bowl screws; then remove the two countersunk attaching screws located next to the venturi.

f. Remove air horn from bowl by lifting it straight up. (Gasket should remain on float bowl).

3. Remove solenoid-metering rod plunger by lifting straight up.

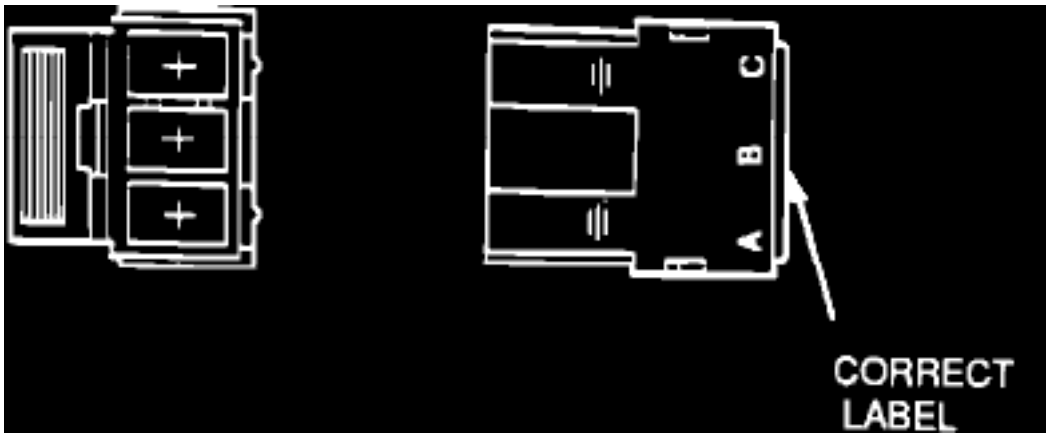
4. Remove air horn gasket by lifting it from the bowl locating pins on the float bowl. DISREGARD GASKET.

5. Remove float bowl insert.

6. Remove metering rods and springs.

7. Remove throttle position sensor by pushing up from bottom of electrical connector and remove TPS and connector assembly from bowl.

8. Reverse procedure to install new TPS sensor using new air horn gasket.



Vehicle Speed Sensor: Technical Service Bulletins Electrical - VSS Connector Mislabeled

GMC NUMBER: 88-T-145

GROUP: 6D-Engine Electrical

DATE: August, 1988

CORPORATE NUMBER:

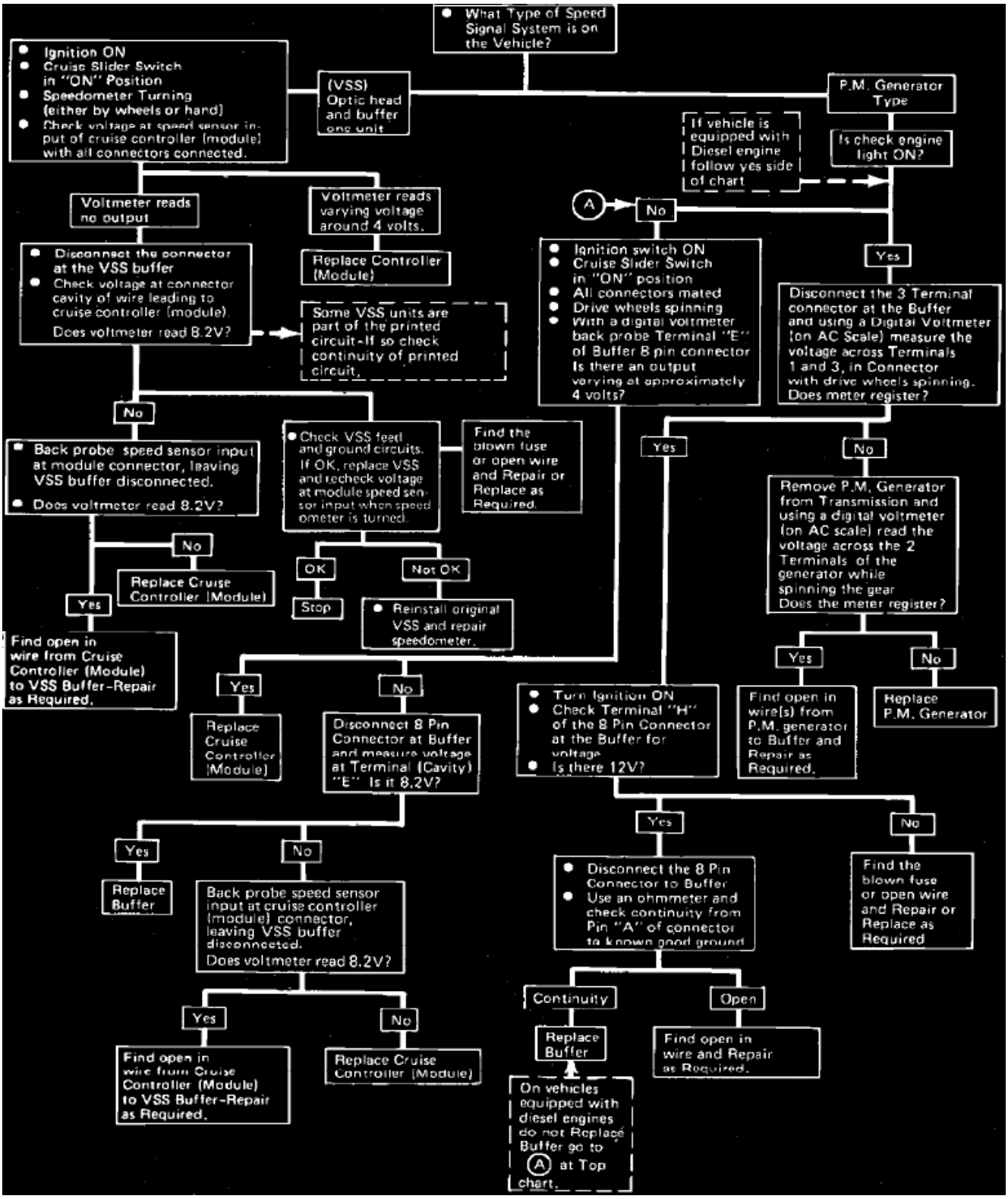
818107

SUBJECT: CONNECTOR MISLABELED

MODELS: 1985-88 G, S, R, AND M VEHICLES

FIGURE NO. 1VEHICLE SPEED SENSOR BUFFER CORRECT CONNECTOR LABEL

Some 1985-88 vehicles may have an electrical connector at the vehicle speed sensor (VSS), which is improperly labeled. The connector will work properly but could cause confusion if electrical troubleshooting is necessary. Figure No. 1 shows a properly labeled connector. The improperly labeled connectors have the "A" and "C" reversed. All Service Manual terminal call-outs use the labeling as shown in Figure No. 1.



Vehicle Speed Sensor: Testing and Inspection

Fig. 17 Speed Sensor System Test (Custom Cruise III)

Refer to Fig. 17 to check speed sensor and related wiring.

Vehicle Speed Sensor: Service and Repair

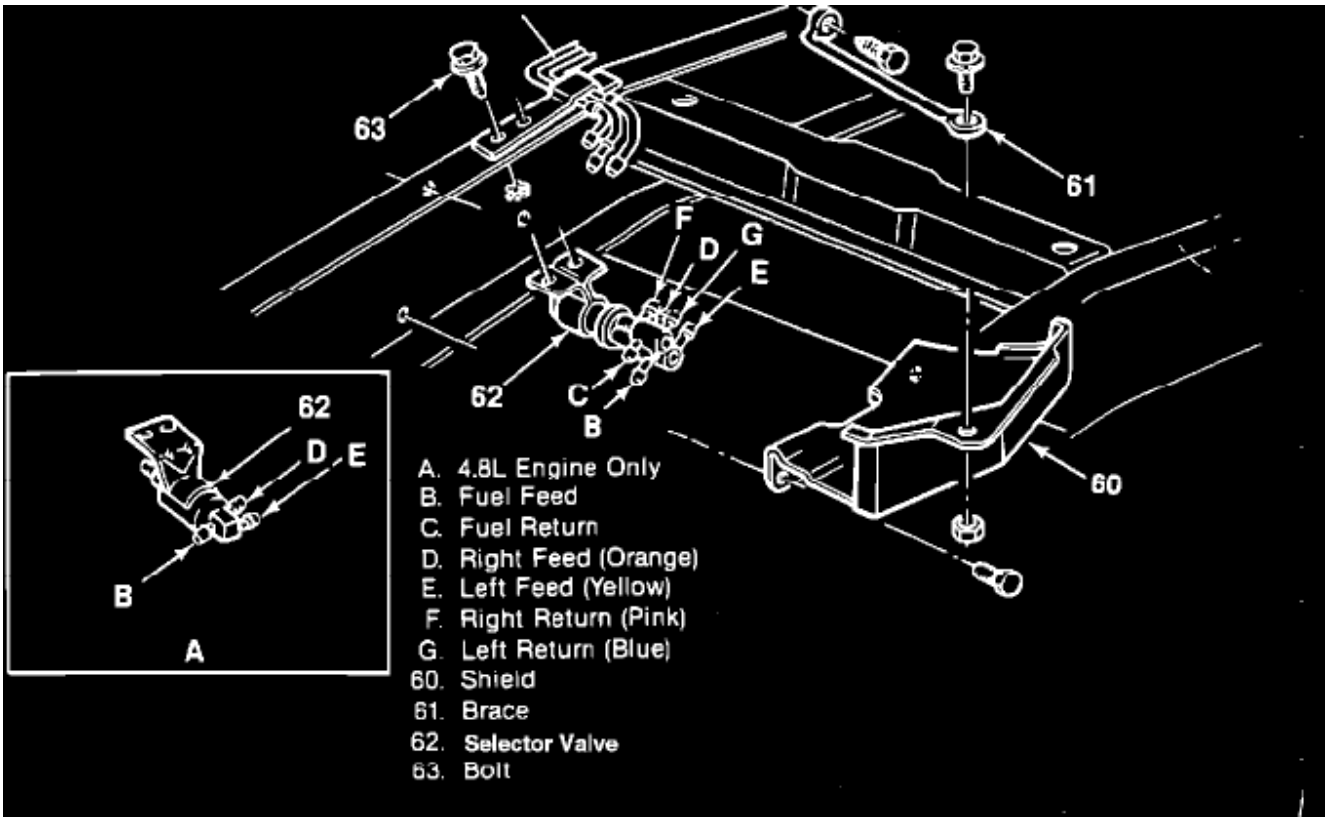
The Vehicle Speed Sensor is located behind the speedometer cluster. To replace sensor proceed as follows:

1. Remove speedometer cluster to gain access to sensor.

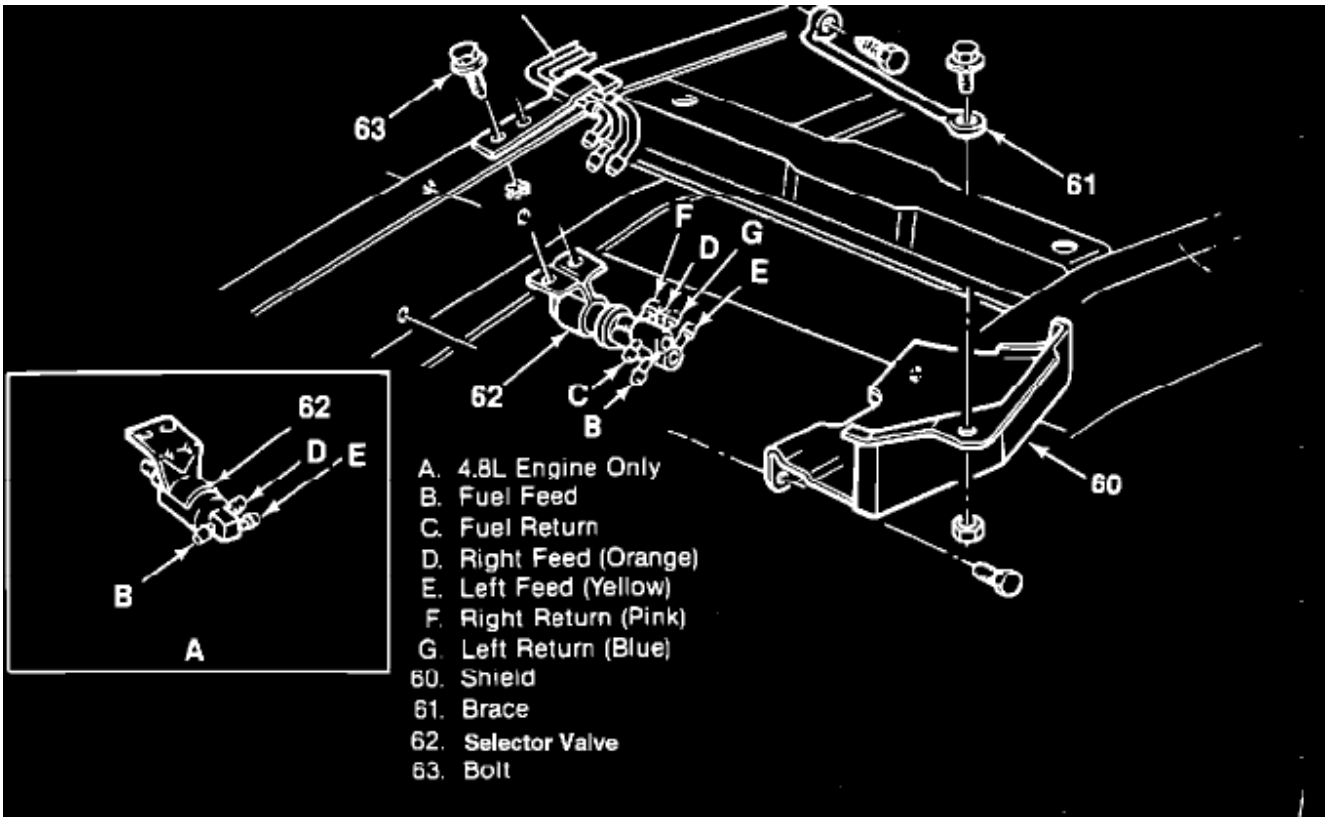
2. Disconnect sensor electrical connectors.

3. Remove sensor retaining screw and the sensor.

4. Reverse procedure to install.



Auxiliary Fuel Selector Valve

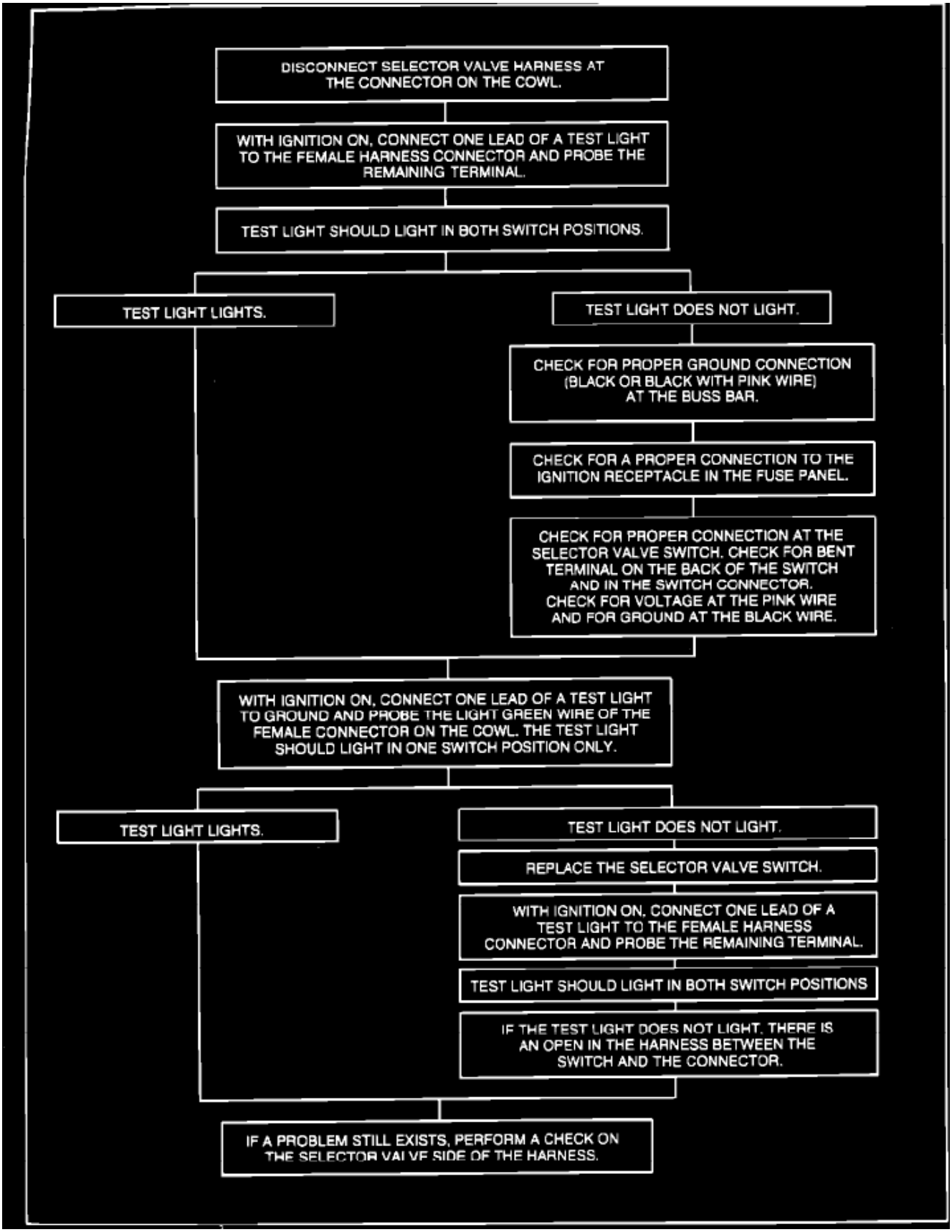


Auxiliary Fuel Tank Control: Description and Operation

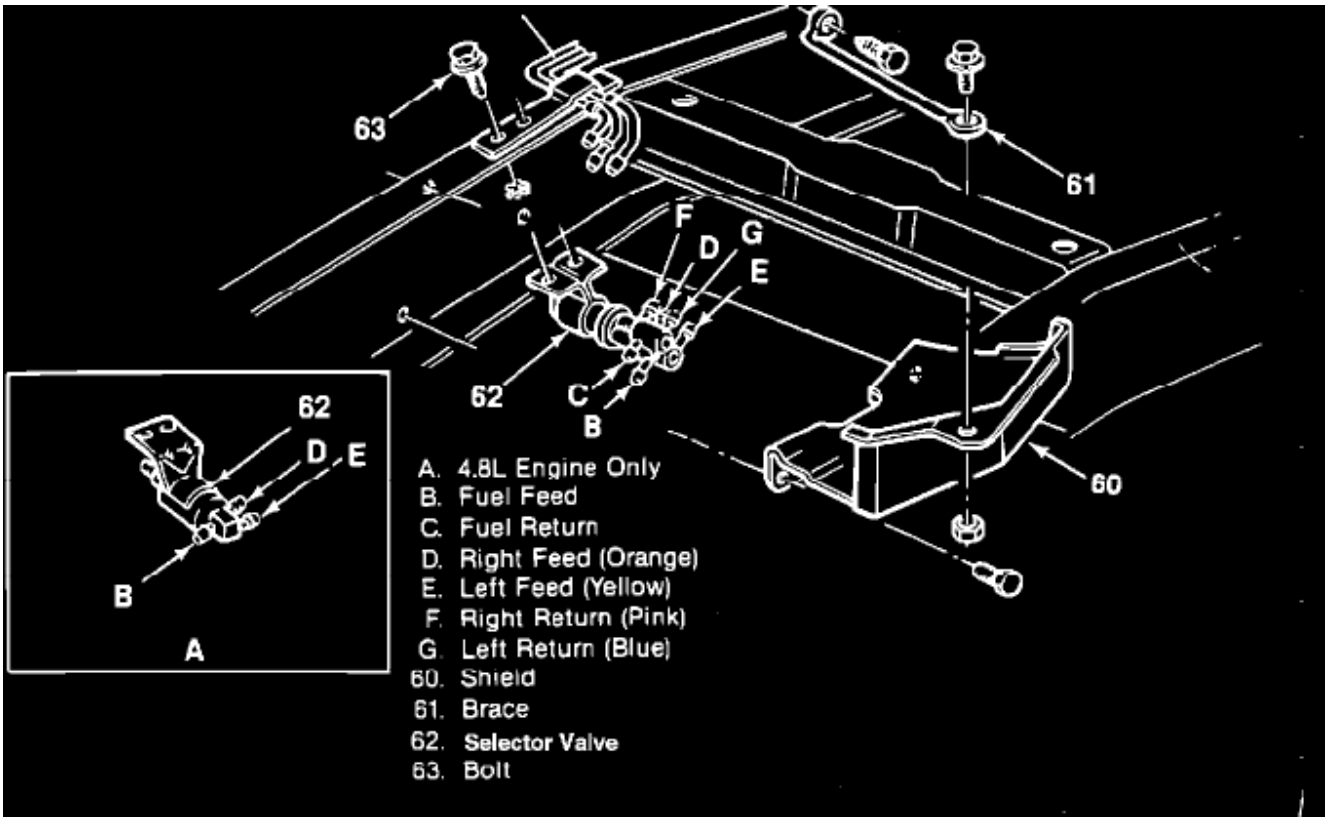
Auxiliary Fuel Selector Valve

NOTE: This information applies only to vehicles equipped with auxiliary fuel tank option.

An auxiliary fuel tank switching valve, controlled by an electrical switch, allows selection of either the primary fuel tank or auxiliary fuel tank.



Auxiliary Fuel Tank Selector Diagnostic Chart



Auxiliary Fuel Tank Control: Service and Repair

Auxiliary Fuel Selector Valve

WARNING: To reduce the risk of personal injury when disconnecting the fuel hoses and lines, cover the fuel hoses and lines with a shop cloth to collect the fuel, and then place the cloth into an approved container.

REMOVAL:

The auxiliary fuel tank control valve is located under the right hand side, center of vehicle, attached to the inner side of the frame.

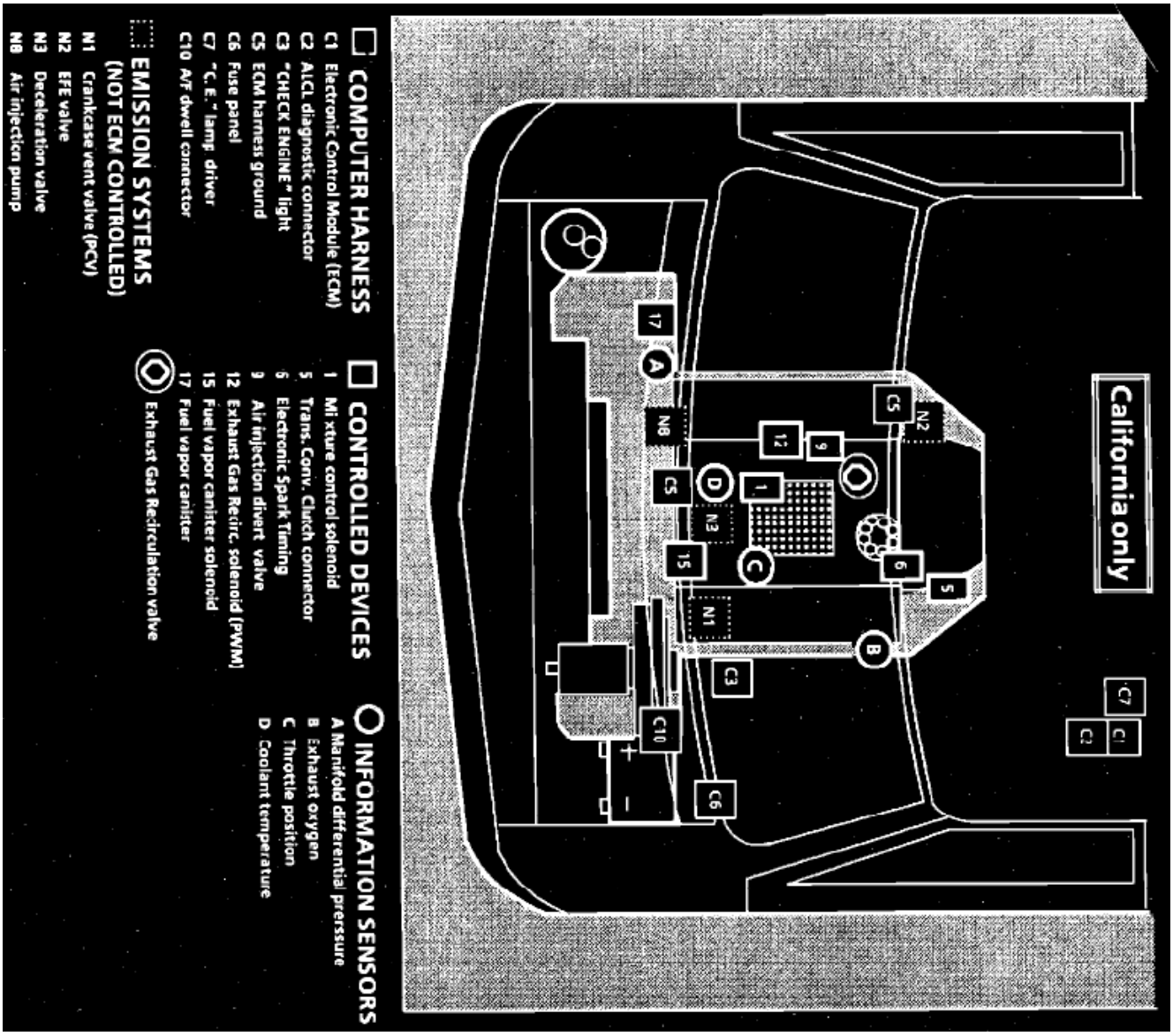
1. Disconnect negative battery cable from vehicle battery. 2. Raise vehicle. 3. Remove hose shield, when required. 4. Remove electrical connector from valve and switch assembly. 5. Remove fuel feed and return hoses. Note position and color markings on hoses. 6. Remove selector valve and meter switch from frame.

INSTALLATION:

1. Install the selector valve and meter switch to the frame. 2. Connect the fuel feed and return hoses, taking care to install hoses in the correct positions. 3. Connect electrical connector to valve and switch assembly. 4. Install hose shield, when required. 5. Lower vehicle. 6. Reconnect negative battery cable to vehicle battery. 7. START vehicle and allow to run while checking for fuel leaks.

Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Fig. 16 Throttle Position Sensor Specifications

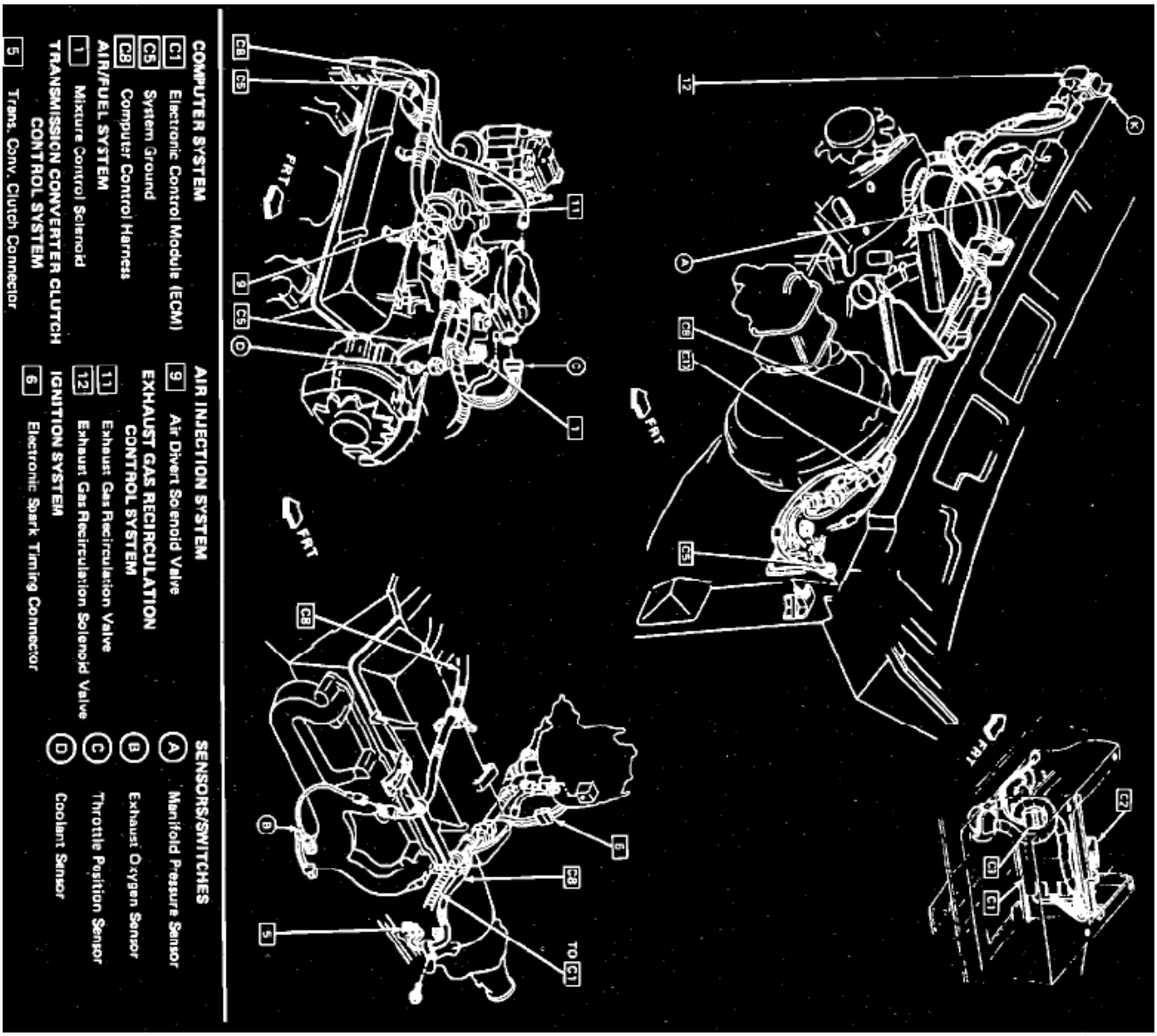


Throttle Position Sensor: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Throttle Position Sensor: Locations Except California

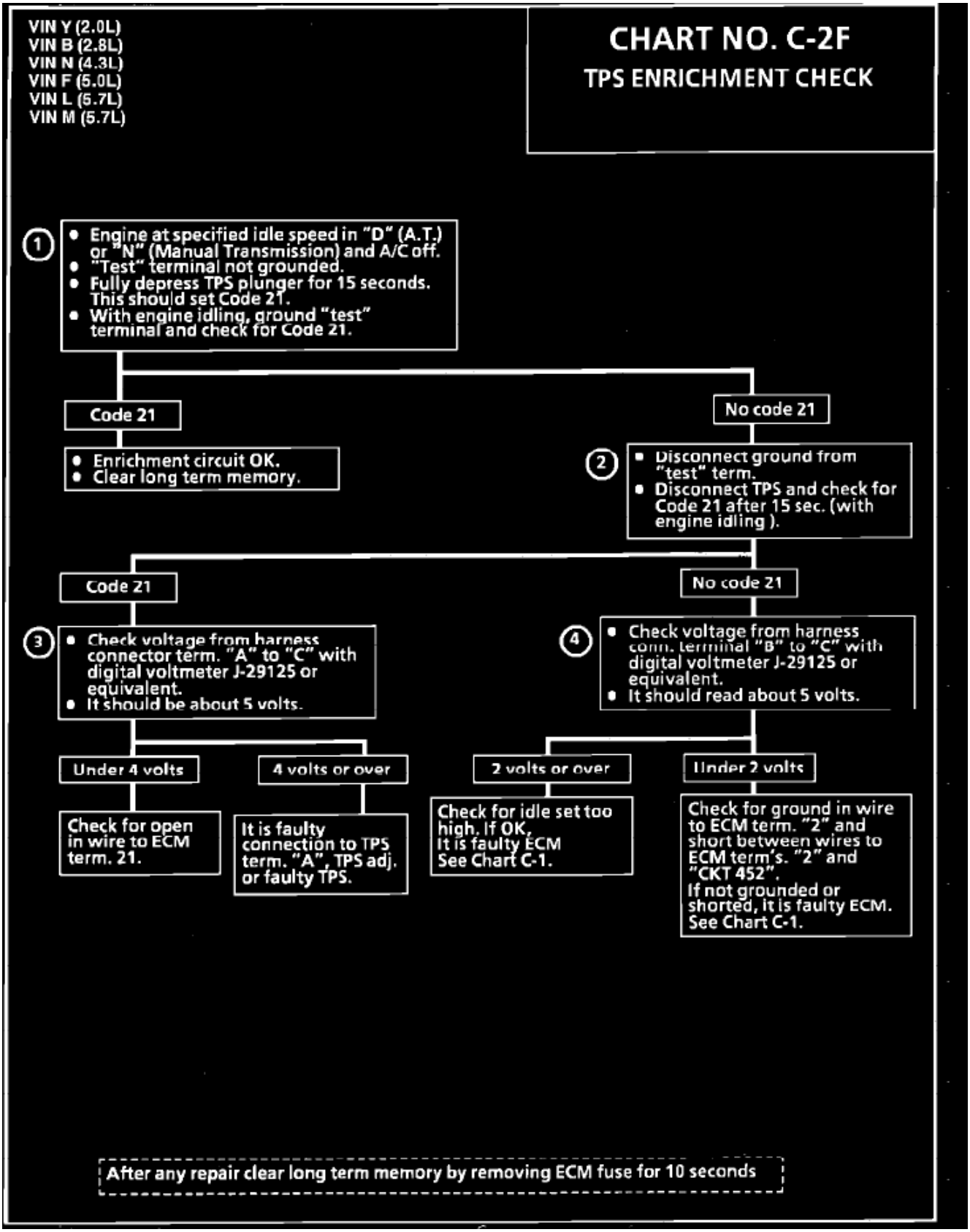
Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

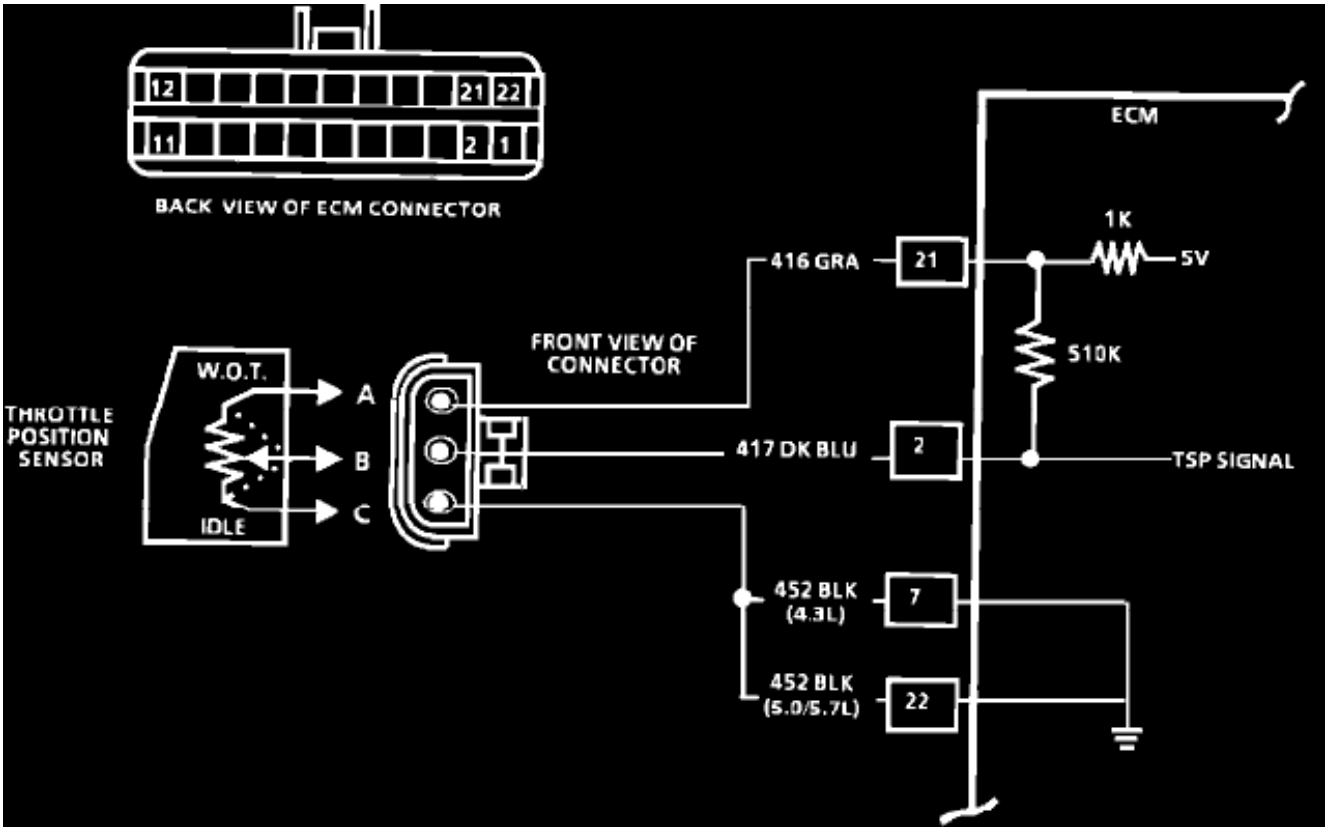
Throttle Position Sensor: Description and Operation

The TPS is mounted in the carburetor body and is moved by the accelerator pump linkage. When the throttle blades are closed, the TPS provides a low voltage (under 1 volt). This voltage signal will increase to up to 5 volts as the throttle blades are opened to wide open throttle. These voltage signals provide an indication of throttle position to the ECM.


VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART NO. C-2F
TPS ENRICHMENT CHECK
1
Engine at specified idle speed in "D" (A.T.) or "N" (Manual Transmission) and A/C off.
"Test" terminal not grounded.
Fully depress TPS plunger for 15 seconds. This should set Code 21.
With engine idling, ground "test" terminal and check for Code 21.
Code 21
Enrichment circuit OK.
Clear long term memory.
No code 21
2
Disconnect ground from "test" term.
Disconnect TPS and check for Code 21 after 15 sec. (with engine idling).
Code 21
3
Check voltage from harness connector term. "A" to "C" with digital voltmeter J-29125 or equivalent.
It should be about 5 volts.
Under 4 volts
Check for open in wire to ECM term. 21.
4 volts or over
It is faulty connection to TPS term. "A", TPS adj. or faulty TPS.
No code 21
4
Check voltage from harness conn. terminal "B" to "C" with digital voltmeter J-29125 or equivalent.
It should read about 5 volts.
2 volts or over
Check for idle set too high. If OK, It is faulty ECM See Chart C-1.
Under 2 volts
Check for ground in wire to ECM term. "2" and short between wires to ECM term's. "2" and "CKT 452". If not grounded or shorted, it is faulty ECM. See Chart C-1.
After any repair clear long term memory by removing ECM fuse for 10 seconds

Throttle Position Sensor: Testing and Inspection

Chart C-2F - TPS Enrichment Check



Wiring Diagram for Chart C-2F - TPS Enrichment Check

CHART C-2F - TPS ENRICHMENT CHECK

Test Description:

1. This step checks that the TPS will cause an ECM "Rich" command when fully depressed manually. On some vehicles, this will cause a low dwell (full rich). On others it will not.

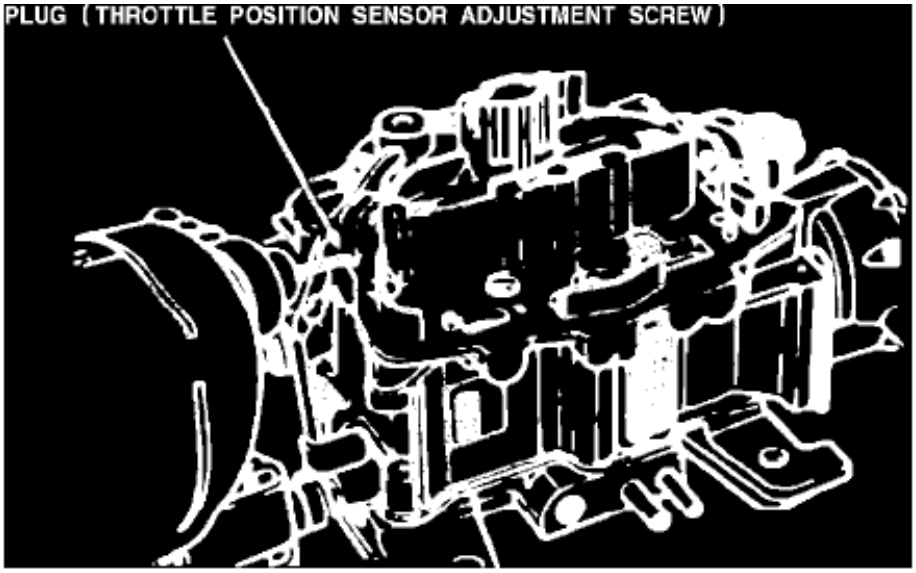
Code 21 should normally be set.

2. This step distinguishes between a faulty TPS or ECM harness/ECM.

Code 21 should normally be set, if engine RPM is not set above specifications.

3. This step checks for 5V. ref. at TPS. It should be about 5 volts. If loss of V. Ref were in the ECM, it should set Codes 21, 32 and 34 since this is the same 5V to VAC Sensor. Therefore, it must be an open in the wire.

4. This step checks for a grounded circuit. Normal circuit should read about 5 volts. Checking for grounded TPS output to Terminal "2" of ECM, or short in CKT 417 and 452 from TPS, indicates whether fault is in wiring or ECM. A voltmeter with a 10 megohms resistance must be used for an accurate reading.



Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.20	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Throttle Position Sensor: Adjustments

Fig. 15 Throttle Position Sensor Adjustment Screw Cover Removal

Fig. 16 Throttle Position Sensor Specifications

Do not remove plug sealing TPS adjustment or adjust TPS unless carburetor is overhauled or ``Computer Command Control (C3)'' system

diagnosis indicates a problem with the switch.

1. Drill a .078 (5/64) inch hole, 1/16-1/8 inch deep, in plug covering TPS adjustment, Fig. 15.

2. Thread a No. 8 sheet metal screw into hole and pry out plug using a suitable lever.

3. Remove TPS adjusting screw using tool J-28696 or equivalent.

4. Leaving electrical connector in place, connect a digital voltmeter between TPS center terminal (B) and bottom terminal (C), using jumper wires if necessary. Only a digital voltmeter with 10 megohm input impedance or higher can be used. Conventional voltmeters do not have sufficient resistance to obtain accurate readings.

5. With ignition on, engine stopped and A/C off, install TPS screw and adjust quickly to obtain specified TPS idle voltage, Fig. 16.

6. Turn ignition off and install new plug over TPS adjusting screw or seal opening with RTV sealer.

Throttle Position Sensor: Service and Repair

To replace Throttle Position Sensor it is necessary to remove the air horn assembly from the carburetor.

1. Remove or disconnect electrical connectors from M/C solenoid and TPS assembly.

2. Air horn removal:

a. Remove upper choke lever from end of choke shaft by removing attaching screw. Rotate upper choke lever to remove lever from choke link.

b. Remove choke link from lower lever inside the float bowl casting. Remove link by holding lower lever outward with small screwdriver and twisting link counter-clockwise.

c. Remove the retainer from the pump link, and remove link from lever. DO NOT remove pump lever from air horn.

d. Remove vacuum break hose from tube on float bowl.

e. Remove air horn-to-bowl screws; then remove the two countersunk attaching screws located next to the venturi.

f. Remove air horn from bowl by lifting it straight up. (Gasket should remain on float bowl).

3. Remove solenoid-metering rod plunger by lifting straight up.

4. Remove air horn gasket by lifting it from the bowl locating pins on the float bowl. DISREGARD GASKET.

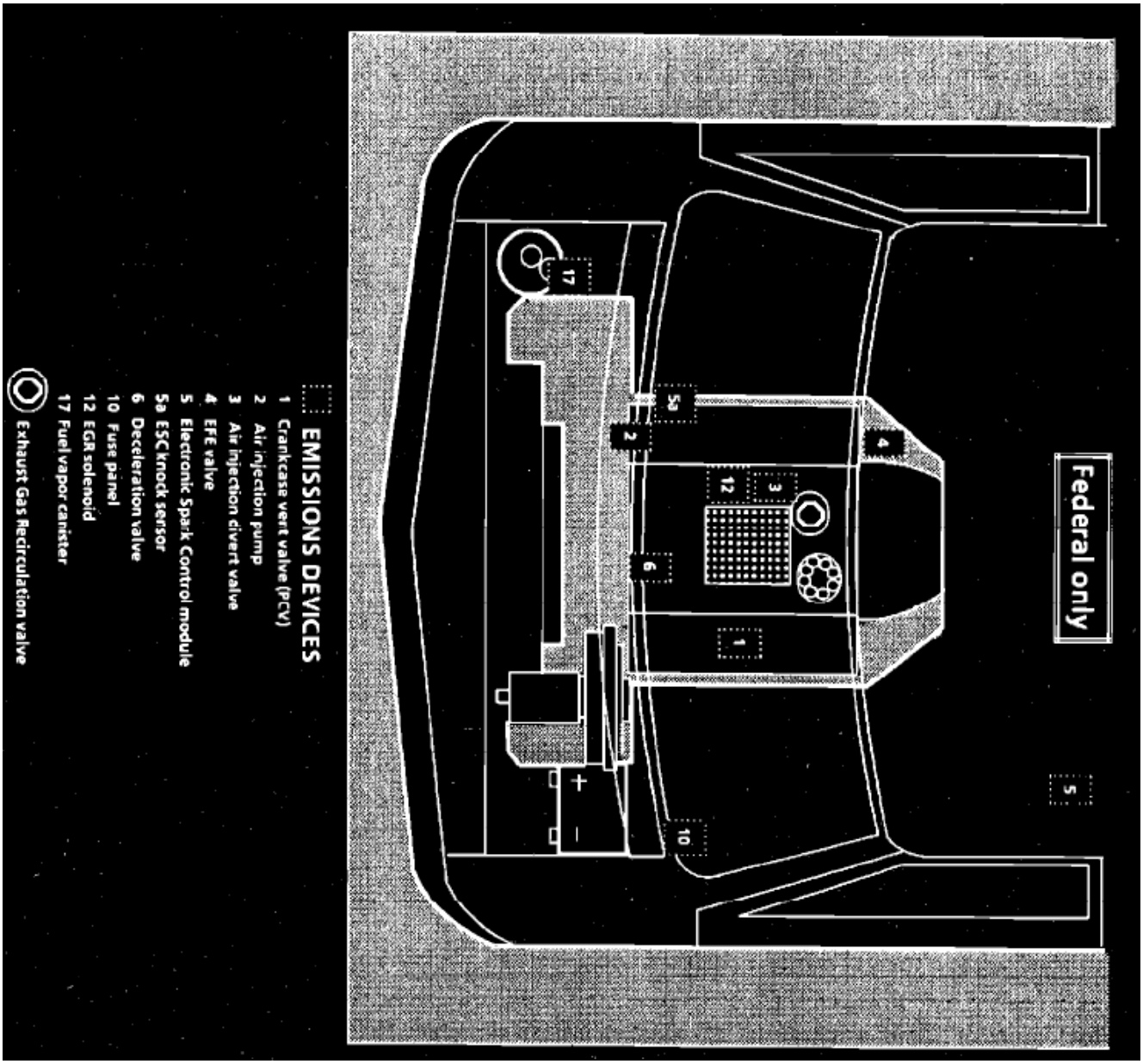
5. Remove float bowl insert.

6. Remove metering rods and springs.

7. Remove throttle position sensor by pushing up from bottom of electrical connector and remove TPS and connector assembly from bowl.

8. Reverse procedure to install new TPS sensor using new air horn gasket.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Powertrain Management > Sensors and Switches - Ignition System > Knock Sensor > Component Information > Locations > Electronic Spark Control Knock Sensor

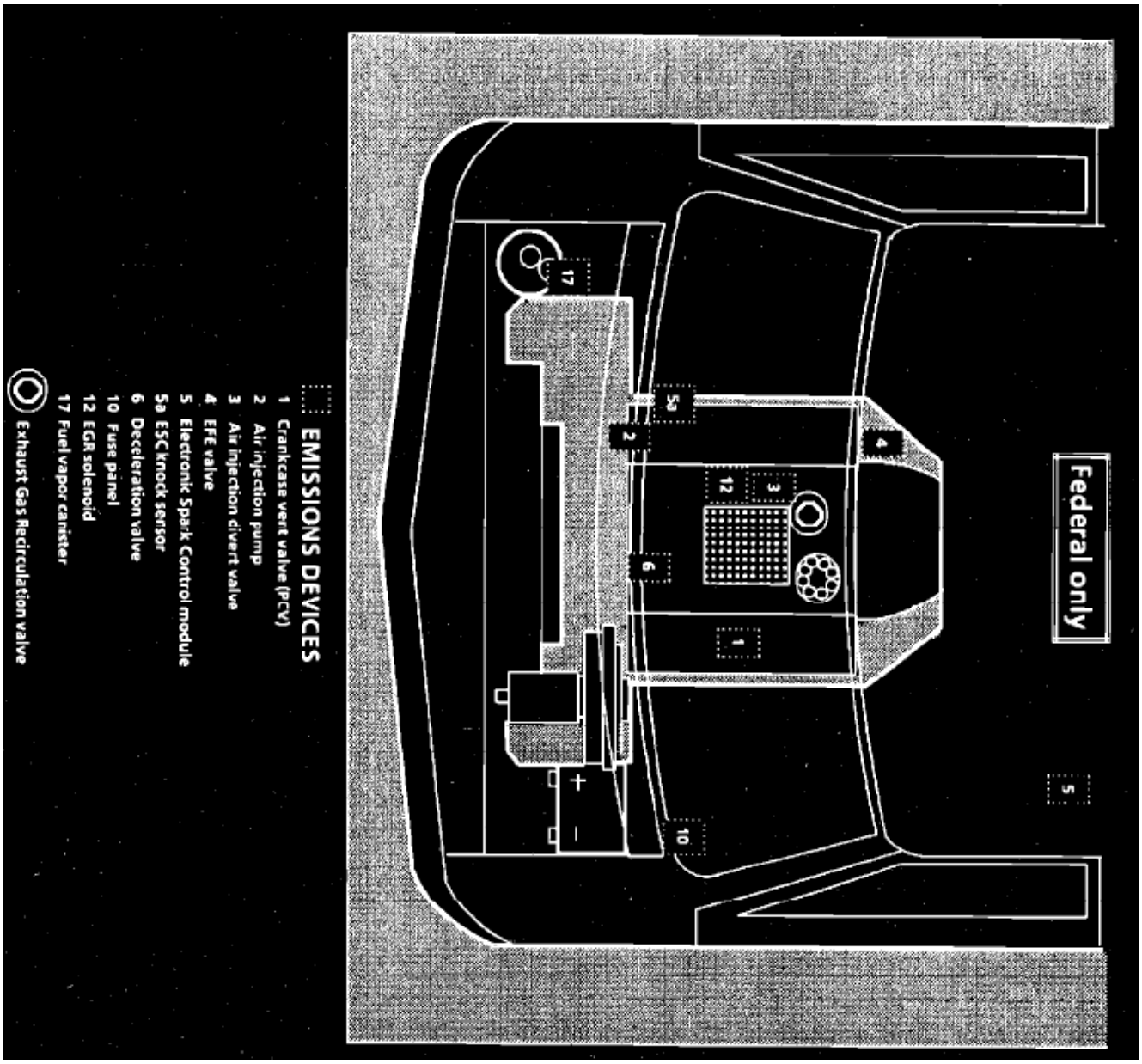


Knock Sensor: Locations Electronic Spark Control Knock Sensor

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Knock Sensor: Locations Electronic Spark Control Module

Underhood & Engine Components.

Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Seat Occupant Sensor: Technical Service Bulletins Restraints - Passenger Presence System Information

INFORMATION

Bulletin No.: 06-08-50-009F

Date: December 23, 2010

Subject: Information on Passenger Presence Sensing System (PPS or PSS) Concerns With Custom Upholstery, Accessory Seat Heaters or Other Comfort Enhancing Devices

Models:

2011 and Prior GM Passenger Cars and Trucks Equipped with Passenger Presence Sensing System

Supercede: This bulletin is being revised to update the model years. Please discard Corporate Bulletin Number 06-08-50-009E (Section 08 - Body and Accessories).

Concerns About Safety and Alterations to the Front Passenger Seat

Important ON A GM VEHICLE EQUIPPED WITH A PASSENGER SENSING SYSTEM, USE THE SEAT COVERS AND OTHER SEAT-RELATED EQUIPMENT AS RELEASED BY GM FOR THAT VEHICLE. DO NOT ALTER THE SEAT COVERS OR SEAT-RELATED EQUIPMENT. ANY ALTERATIONS TO SEAT COVERS OR GM ACCESSORIES DEFEATS THE INTENDED DESIGN OF THE SYSTEM. GM WILL NOT BE LIABLE FOR ANY PROBLEMS CAUSED BY USE OF SUCH IMPROPER SEAT ALTERATIONS, INCLUDING ANY WARRANTY REPAIRS INCURRED.

The front passenger seat in many GM vehicles is equipped with a passenger sensing system that will turn off the right front passenger's frontal airbag under certain conditions, such as when an infant or child seat is present. In some vehicles, the passenger sensing system will also turn off the right front passenger's seat mounted side impact airbag. For the system to function properly, sensors are used in the seat to detect the presence of a properly-seated occupant. The passenger sensing system may not operate properly if the original seat trim is replaced (1) by non-GM covers, upholstery or trim, or (2) by GM covers, upholstery or trim designed for a different vehicle or (3) by GM covers, upholstery or trim that has been altered by a trim shop, or (4) if any object, such as an aftermarket seat heater or a comfort enhancing pad or device is installed under the seat fabric or between the occupant and the seat fabric.

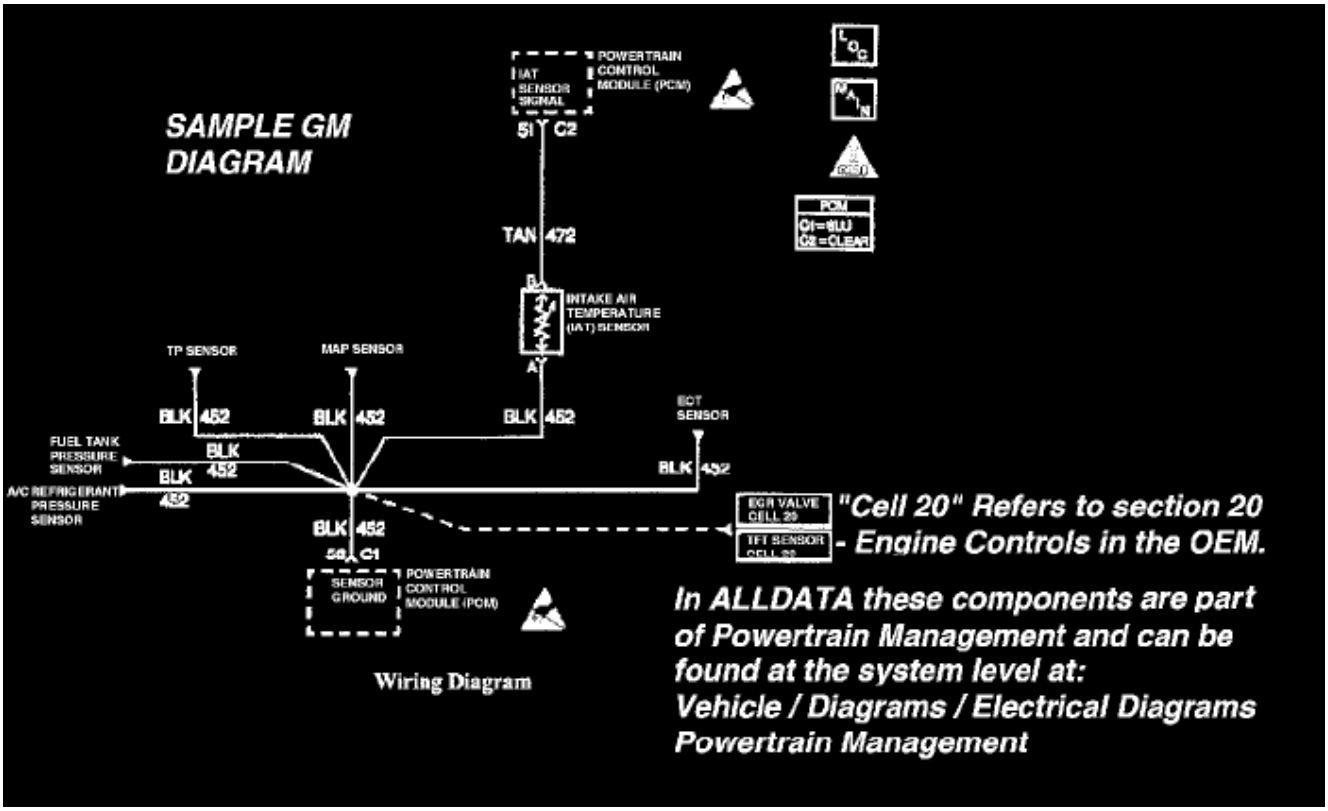
Aftermarket Seat Heaters, Custom Upholstery, and Comfort Enhancing Pads or Devices

Important ON A GM VEHICLE EQUIPPED WITH A PASSENGER SENSING SYSTEM, USE ONLY SEAT COVERS AND OTHER SEAT-RELATED EQUIPMENT RELEASED AS GM ACCESSORIES FOR THAT VEHICLE. DO NOT USE ANY OTHER TYPE OF SEAT COVERS OR SEAT-RELATED EQUIPMENT, OR GM ACCESSORIES RELEASED FOR OTHER VEHICLE APPLICATIONS. GM WILL NOT BE LIABLE FOR ANY PROBLEMS CAUSED BY USE OF SUCH

IMPROPER SEAT ACCESSORIES, INCLUDING ANY WARRANTY REPAIRS MADE NECESSARY BY SUCH USE.

Many types of aftermarket accessories are available to customers, upfitting shops, and dealers. Some of these devices sit on top of, or are Velcro(R) strapped to the seat while others such as seat heaters are installed under the seat fabric. Additionally, seat covers made of leather or other materials may have different padding thickness installed that could prevent the Passenger Sensing System from functioning properly. Never alter the vehicle seats. Never add pads or other devices to the seat cushion, as this may interfere with the operation of the Passenger Sensing System and either prevent proper deployment of the passenger airbag or prevent proper suppression of the passenger air bag.

Disclaimer



Neutral Safety Switch: Diagram Information and Instructions

CELL REFERENCES

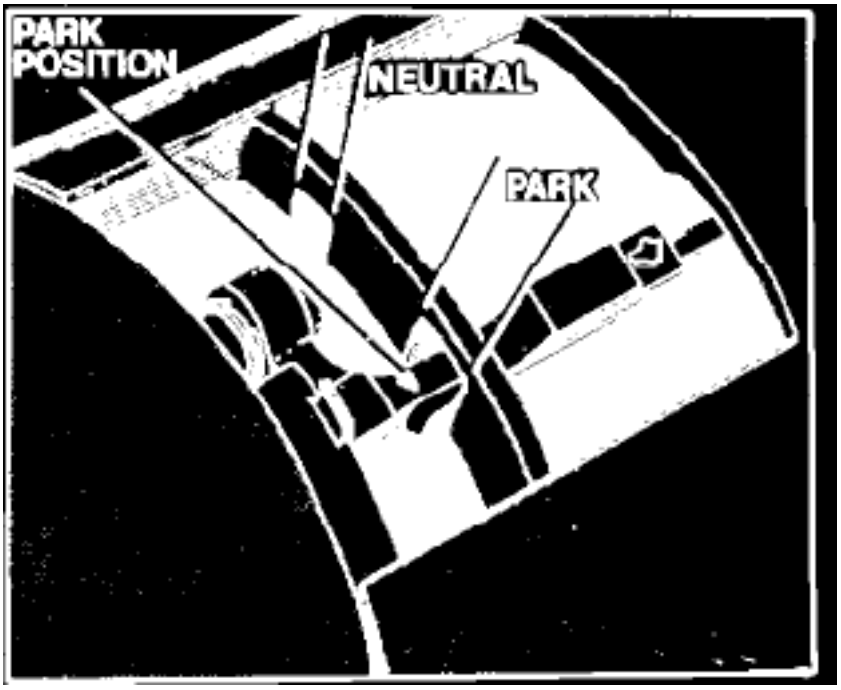
General Motors vehicles often use "CELL" references in their electrical wiring diagrams. These references are used in the Original Equipment Manual to refer to a section in the manual and not a specific diagram(s).

GM Sample Diagram W/ Cell Reference

For instance, in the diagram illustrated "Cell 20" is not a reference to another diagram but a reference to "Section 20" in the OE manual. In the example, "Section 20" is the engine control section of the manual.

To navigate through these "Cell" references start at the vehicle level and go to: Diagrams / Electrical Diagrams - for a complete list of the diagrams available for the vehicle. Choose the system you are working on and view those diagrams.

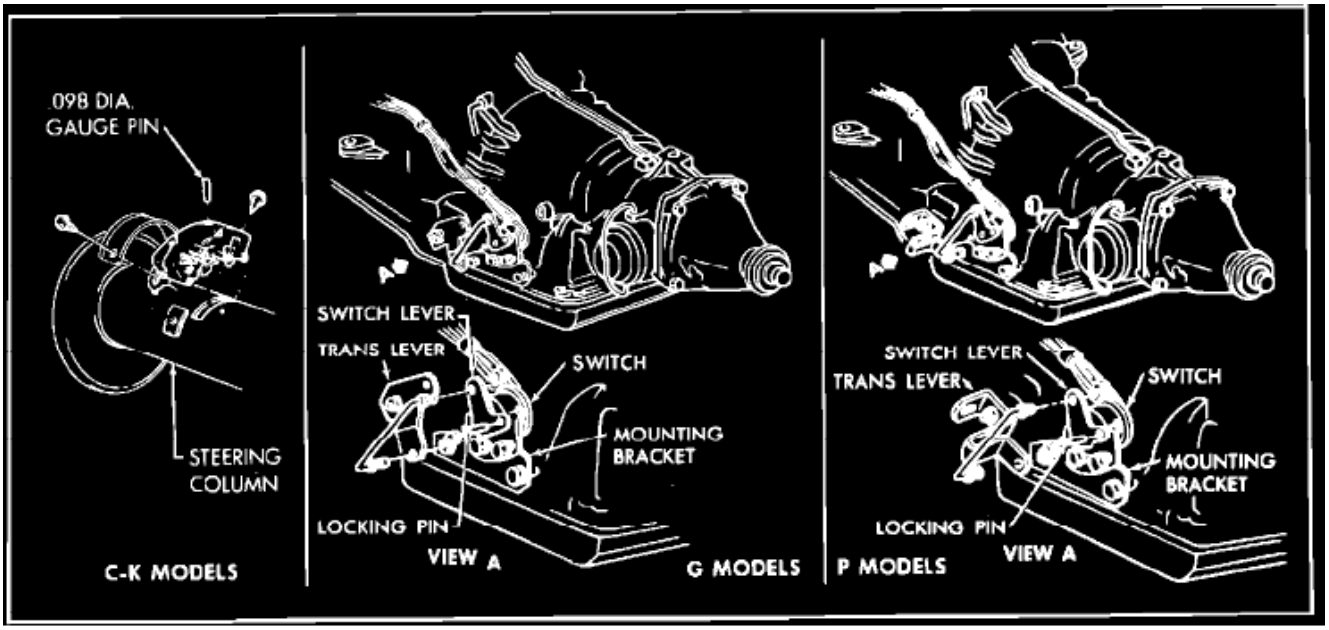
Note: If unsure of the system - try utilizing the search feature. Type a component in the search feature that belongs to the system and when the results are displayed note the path displayed. This will show the system the component belongs in.

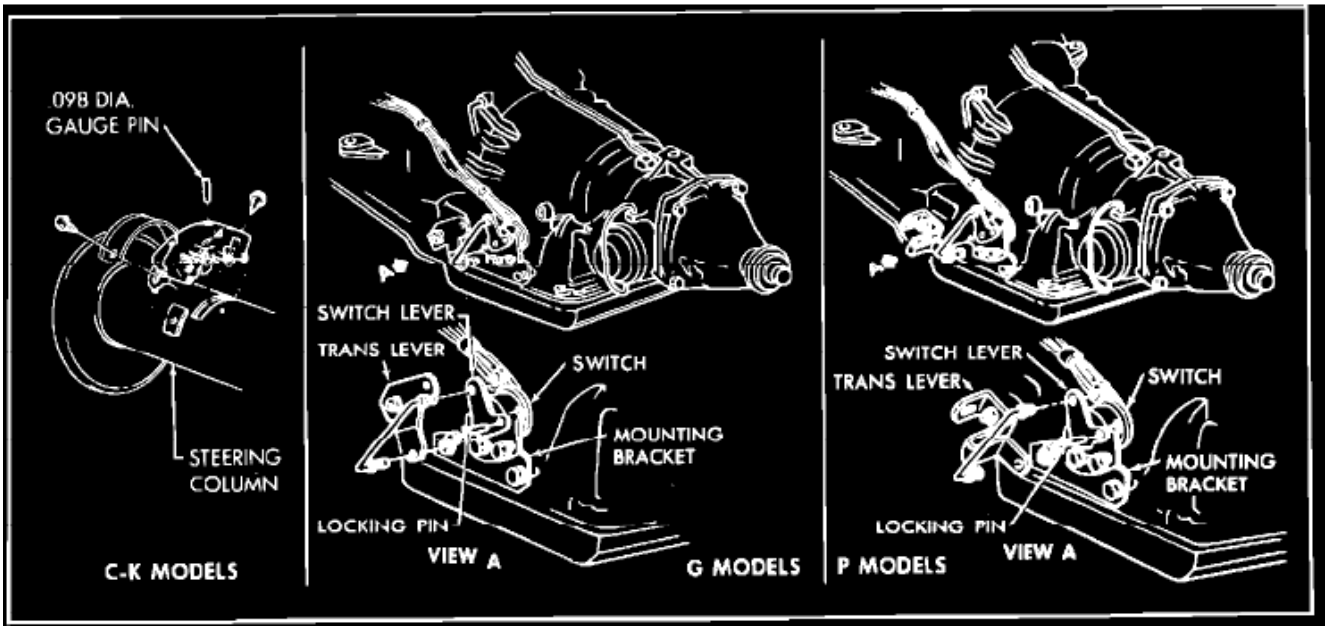


Neutral Safety Switch: Description and Operation

Fig. 12 Mechanical neutral start system, shown in Park position

On some automatic transmission equipped vehicles, the actuation of the ignition switch is prevented by a mechanical lockout system, Fig. 12, which prevents the lock cylinder from rotating when the selector lever is out of Park or Neutral. When the selector lever is in Park or Neutral, the slots in the bowl plate and the finger on the actuator rod align, allowing the finger to pass through the bowl plate, in turn actuating the ignition switch, Fig. 12. If the selector lever is in any position other than Park or Neutral, the finger contacts the bowl plate when the lock cylinder is rotated, thereby preventing full travel of the lock cylinder.


.098 DIA. GAUGE PIN
STEERING COLUMN
C-K MODELS
SWITCH LEVER
TRANS LEVER
SWITCH
MOUNTING BRACKET
LOCKING PIN
VIEW A
G MODELS
SWITCH LEVER
TRANS LEVER
SWITCH
MOUNTING BRACKET
LOCKING PIN
VIEW A
P MODELS


.098 DIA. GAUGE PIN
STEERING COLUMN
C-K MODELS
SWITCH LEVER
TRANS LEVER
SWITCH
MOUNTING BRACKET
LOCKING PIN
VIEW A
G MODELS
SWITCH LEVER
TRANS LEVER
SWITCH
MOUNTING BRACKET
LOCKING PIN
VIEW A
P MODELS

Neutral Safety Switch: Service and Repair

On some automatic transmission equipped vehicles, the back-up light switch is integral with the neutral start switch.

Fig. 13 Neutral start switch replacement. Series 10---30/1500---3500

C, K, R & V MODELS

1. Disconnect battery ground cable.

2. Disconnect electrical connector at switch.

3. Remove switch mounting screws, then the switch.

4. Position shift lever in neutral gate notch.

5. Insert a .098 inch gauge pin into switch gauge hole as shown, Fig. 13, then assemble switch to column by inserting carrier tang into shift tube slot.

6. Install switch mounting screws into retainers. If retainers strip, they must be replaced.

7. Remove gauge pin, then position shift lever into Park to shear internal plastic pin in switch.

8. Return shift lever to neutral gate notch, then ensure switch gauge hole will accept .080 inch gauge pin. If not, loosen mounting screws, then rotate switch on column until .098 inch gauge pin can be reinserted into gauge hole.

9. Reconnect electrical connector and battery ground cable.

Fig. 13 Neutral start switch replacement. Series 10---30/1500---3500

G & P MODELS

1. Raise and support vehicle, then disconnect battery ground cable.

2. Disconnect electrical harness from switch.

3. Remove switch to mounting bracket retaining bolts and the switch, Fig. 13.

4. Loosely install new switch to mounting bracket, then align .093---.097 inch hole in transmission lever with hole in switch assembly. Insert pin to hold in neutral position, Fig. 13.

5. Set transmission lever in neutral position by moving lever counterclockwise to L1 detent, then move clockwise three detents.

6. Install rod into transmission and switch levers and secure with clips.

7. Tighten switch retaining bolts, lower vehicle and check switch for proper operation.

Fluid Pressure Sensor/Switch: Customer Interest A/T - Buzzing Noise at Idle

Number: 93-29-7A Section: 7A Date: OCT. 1992 Corporate Bulletin No.: 277142 ASE No.: A2

Subject: BUZZING NOISE AT IDLE

Model and Year: 1982-93 CAPRICE, CAMARO AND CORVETTE 1982-93 C/K, R/V, S/T, M/L AND G TRUCKS WTIH 4L60 AUTOMATIC TRANSMISSION

TRANSMISSION APPLICATIONS: 1982-1993 HYDRA-MATIC 4L60 (MD8)

TRANSMISSION MODELS: All

SUBJECT: Pressure Regulator Valve Buzz

VEHICLE APPLICATIONS: B, D, F, Y - Cars C/K, R/V, S/T Trucks G, M, L - Vans

CONDITION:

Some 1982-1993 vehicles equipped with a HYDRA-MATIC 4L60 transmission may have a buzzing noise coming from the transmission when the vehicle is at idle. The buzzing noise may be noticed more when the vehicle is in reverse at idle.

CAUSE:

The buzzing noise may be a result of pressure regulator valve oscillating due to oil pressure instability at lower idle RPM.

CORRECTION:

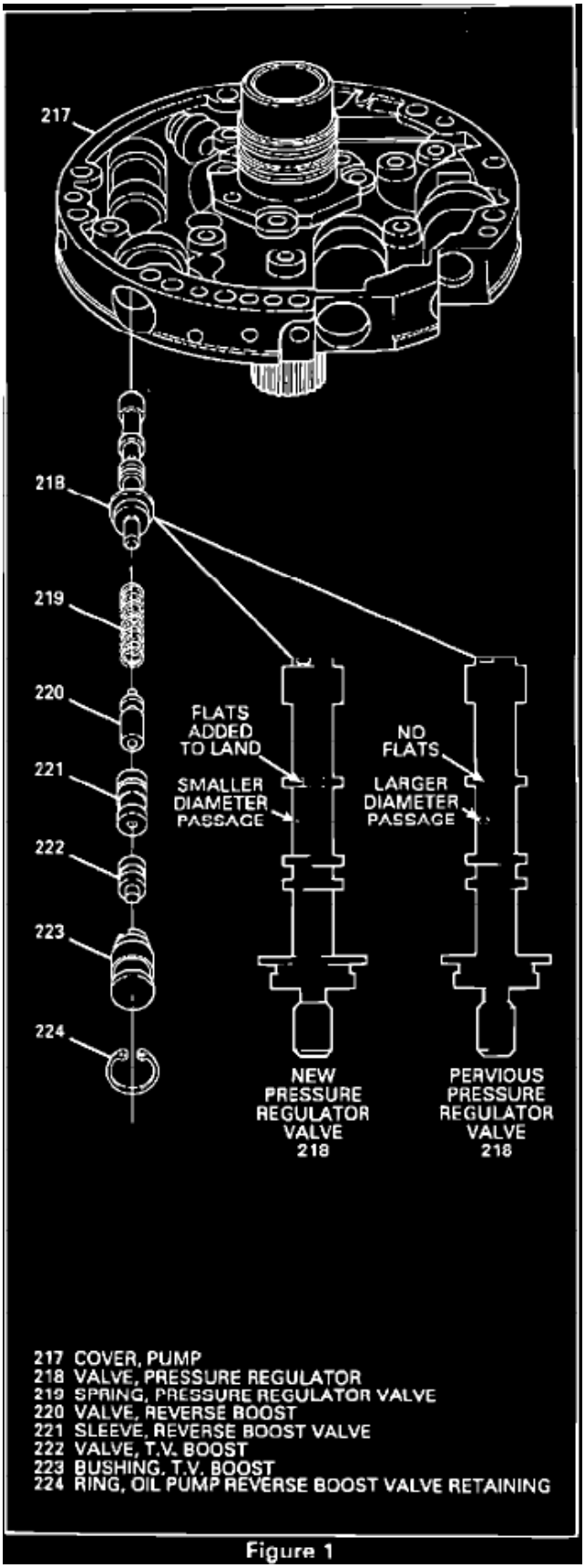


Figure 1

A new pressure regulator valve (III. 218) has been made which will improve the oil pressure stability at lower RPM.

SERVICE PARTS INFORMATION:

Description Part Number

Valve, Pressure Regulator (III. 218) 8684048

Part numbers are for Reference Only. Check with your Parts Department for latest information.

Labor Operation No.: K6550 Valve, Pressure Regulator-R&R; or Replace

Use the appropriate labor time in the labor time guide.

Parts are currently available from GMSPO.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Transmission and Drivetrain > Sensors and Switches - A/T > Fluid Pressure Sensor/Switch, A/T > Component Information > Technical Service Bulletins > All Technical Service Bulletins: > 93297A > Oct > 92 > A/T - Buzzing Noise at Idle

Number: 93-29-7A Section: 7A Date: OCT. 1992 Corporate Bulletin No.: 277142 ASE No.: A2

Subject: BUZZING NOISE AT IDLE

Model and Year: 1982-93 CAPRICE, CAMARO AND CORVETTE 1982-93 C/K, R/V, S/T, M/L AND G TRUCKS WTIH 4L60 AUTOMATIC TRANSMISSION

TRANSMISSION APPLICATIONS: 1982-1993 HYDRA-MATIC 4L60 (MD8)

TRANSMISSION MODELS: All

SUBJECT: Pressure Regulator Valve Buzz

VEHICLE APPLICATIONS: B, D, F, Y - Cars C/K, R/V, S/T Trucks G, M, L - Vans

CONDITION:

Some 1982-1993 vehicles equipped with a HYDRA-MATIC 4L60 transmission may have a buzzing noise coming from the transmission when the vehicle is at idle. The buzzing noise may be noticed more when the vehicle is in reverse at idle.

CAUSE:

The buzzing noise may be a result of pressure regulator valve oscillating due to oil pressure instability at lower idle RPM.

CORRECTION:

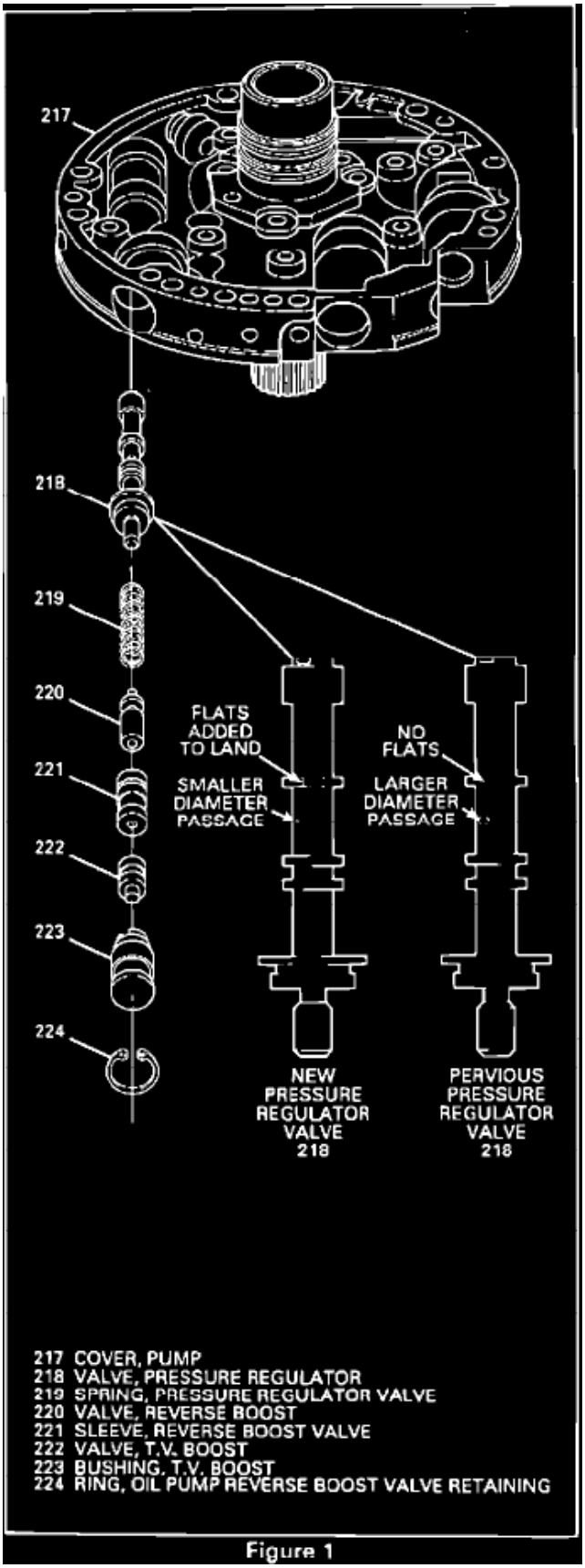


Figure 1

A new pressure regulator valve (III. 218) has been made which will improve the oil pressure stability at lower RPM.

SERVICE PARTS INFORMATION:

Description Part Number

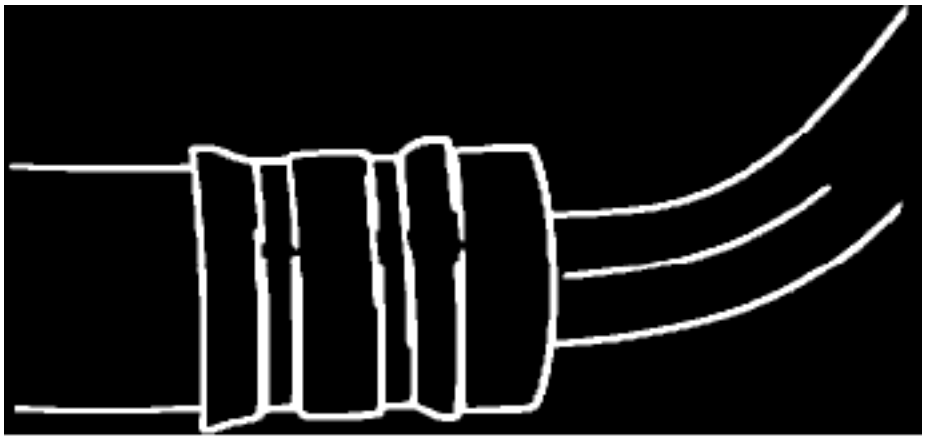
Valve, Pressure Regulator (III. 218) 8684048

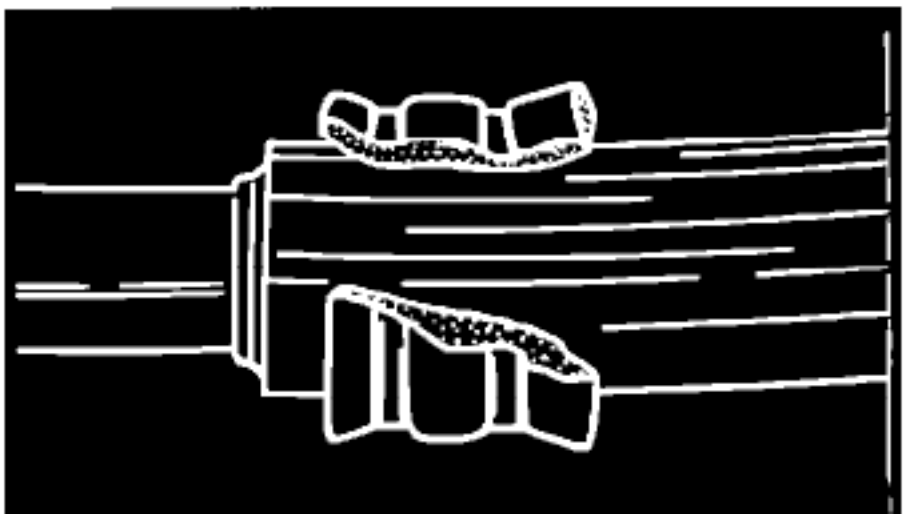
Part numbers are for Reference Only. Check with your Parts Department for latest information.

Labor Operation No.: K6550 Valve, Pressure Regulator-R&R; or Replace

Use the appropriate labor time in the labor time guide.

Parts are currently available from GMSPO.





Hose/Line HVAC: All Technical Service Bulletins A/C - Refrigerant Hose & Clamp Repairs

85-40 1B (Ia) FEB., 1985 Subject:

A/C REFRIGERANT HOSE AND CLAMP REPAIRS

Model and Year: ALL CHEVROLET VEHICLES

TO: ALL CHEVROLET DEALERS

WARRANTY AND NON-WARRANTY REPAIRS

When a freon leak is detected at an air conditioning refrigerant hose connection which has a crimped metal band, the crimped band may be replaced with a special screw-type service clamp for non-warranty type repairs according to the following clamp replacement procedure. Also included is a hose repair procedure for a damaged and/or leaking refrigerant hose. This allows the dealer the added flexibility of repairing hose assemblies rather than replacing them.

Warranty repairs should continue the replacement procedure.

NOTICE: Hoses marked with the words "PARKER", "PARKER PARFLEX 80" or "PARFLEX 80" are nylon and cannot be repaired by these procedures. These hoses should be replaced as entire assemblies.

Figure 1

CLAMP REPLACEMENT

1. Completely discharge the air conditioning system by an approved method.

2. Disconnect the entire hose assembly and remove it from the vehicle. Put tape or approved plastic caps over all of the openings to the system, including the removed hose assembly, to prevent dirt and moisture contamination.

3. Using a fine tooth hacksaw, cut a wide notch all the way across the crimped metal band (see Figure 1).

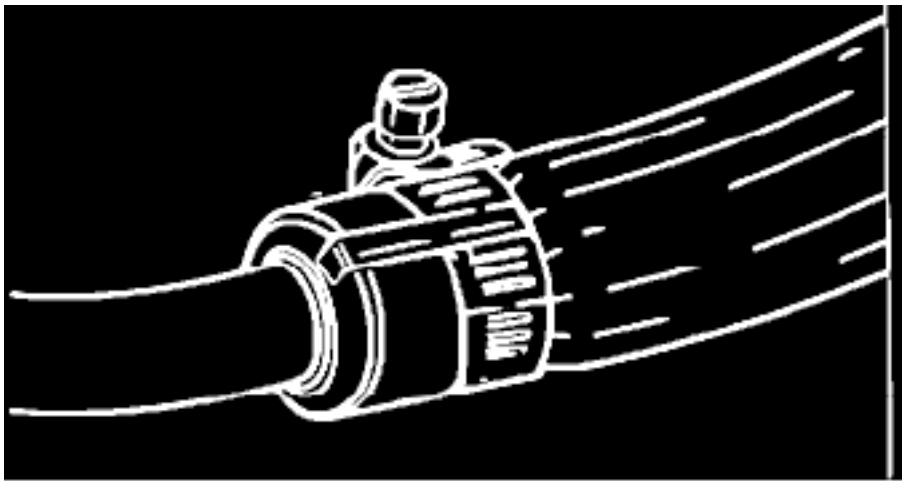
NOTICE: AVOID CUTTING THE HOSE MATERIAL.

FIGURE 2

4. Using a cold chisel and a small hammer, tap carefully at the notch until the band is split all the way across (see Figure 2).

5. Pry the band open until it can be removed without cutting the hose material with the burred edges.

NOTICE: If the hose material has been cut, all or part of the hose must be replaced. See Table A for applicable clamps, hose material, and splicer fitting kits. The repaired hose should be the same overall length as the original.



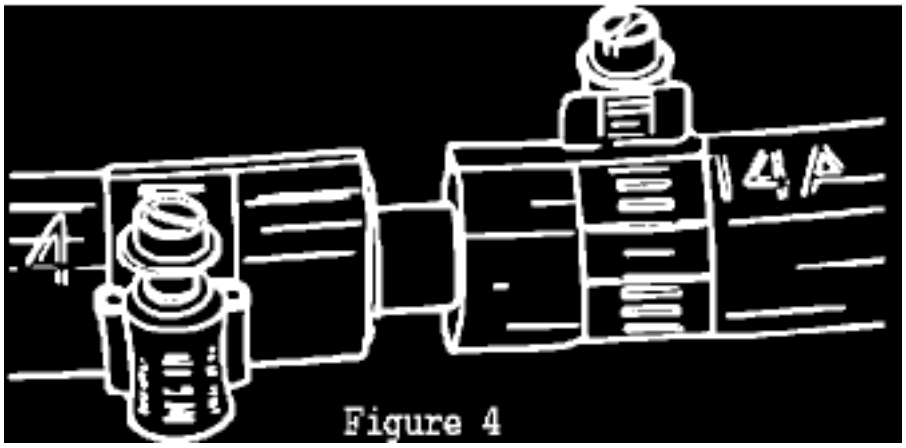


FIGURE 3

6. Install the special screw-type service clamp so that the locator lug is positioned on the hose end (see Figure 3). Tighten clamp to 4.5 N-m (40 in. lbs.).

7. Reinstall the hose assembly on the vehicle with new 'O' rings where used. A/C compressor oil should be used to lubricate the 'O' rings.

8. Partially charge the system and perform a leak test before completely recharging.

FIGURE 4

HOSE REPAIR

1. Perform Step #1 of the Clamp Replacement Procedure.

2. Using a fine tooth hacksaw, cut all the way through the metal band clamp and into the top layer of the hose on one end of the hose if only part of it is being replaced or on both ends if the entire hose is being replaced.

3. Pry the band open until it can be removed without damaging the fitting.

4. If only part of the hose is being replaced:

a. Cut the bad part away squarely.

b. Use a new section of the hose of the same inside diameter and cut it 13 mm (1/2") shorter than the removed section (see Table A for parts applications).

c. Install the proper size splicer fitting kit per the instructions, between the remaining section and new section of hose and install the other end of the hose on the fitting. Align fittings so that there will be no twist in the hose when it is on the vehicle (see Figure 4). See Table A for parts applications.

d. Install two service clamps at a splice and one at a fitting as in Step #6 of the Clamp Replacement Procedure.

e. Perform Steps #7 and #8 of the Claim Replacement procedure.

5. If the entire section of hose is being replaced:

a. Cut the old hose off of both fittings.

b. Install a new section of hose of the same inside diameter and cut to the same length and install it on fittings. Align fittings so that there will be no twist in the hose when it is on the vehicle. See Table A for parts applications.

c. Install a service clamp at each end as in Step #6 of the Clamp Replacement Procedure.

d. Perform Steps #7 and #8 of the Clamp Replacement Procedure. TABLE A

MATERIAL AND SPLICER FITTING KITS

Hose Roll

Group # Part # Description I.D. Length

9.242/ (Hose O.D. 11/16"-

1.166 3909030 A/C Hose Clamp 1-7/32")

8.962 230882 A/C Refrigerant Hose 5/16" 15'

8.962 230883* A/C Refrigerant Hose 13/32" 15'

8.962 12309273* A/C Refrigerant Hose 13/32" 15'

8.962 12309274 A/C Refrigerant Hose 13/32" 50'

8.962 230884 A/C Refrigerant Hose 1/2" 15'

8.962 12309271* A/C Refrigerant Hose 1/2" 15'

8.962 12309272 A/C Refrigerant Hose 1/2" 50'

8.962 12309275 A/C Refrigerant Hose 5/8" 15'

8.962 12309276 A/C Refrigerant Hose 5/8" 50'

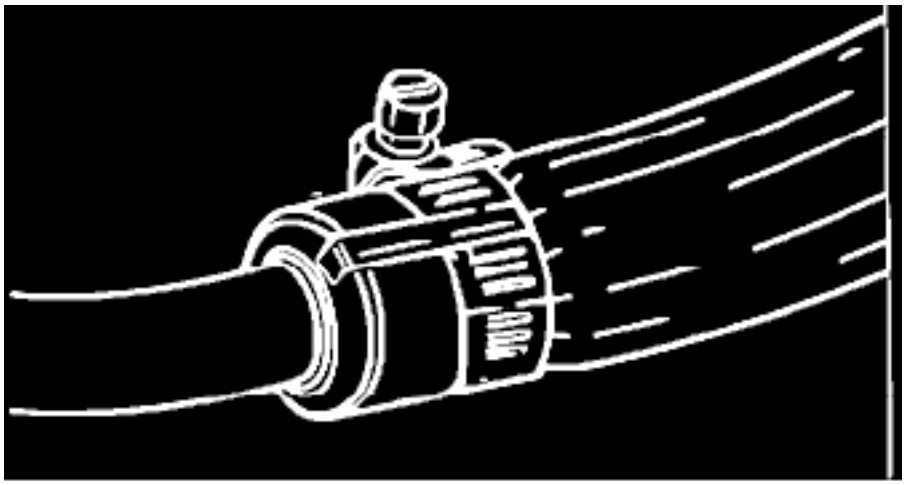
9.222 3023686 Splicer Fitting Kit 5/16"

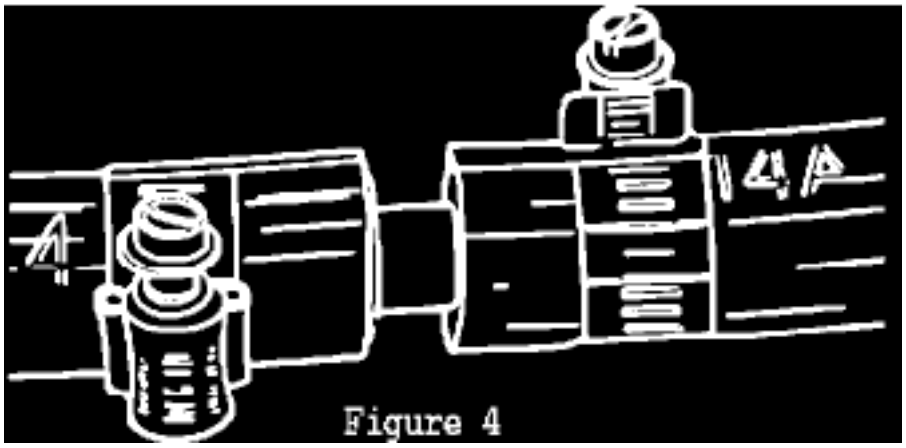
9.222 3023687 Splicer Fitting Kit 13/32"

9.222 3023688 Splicer Fitting Kit 1/2"

9.222 3023689 Splicer Fitting Kit 5/8"

* Hoses in this list which are of the same inside diameter and roll length are interchangeable. Different part numbers denote different manufacturer sources in these cases.





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3. Pry the band open until it can be removed without damaging the fitting.

4. If only part of the hose is being replaced:

a. Cut the bad part away squarely.

b. Use a new section of the hose of the same inside diameter and cut it 13 mm (1/2") shorter than the removed section (see Table A for parts applications).

c. Install the proper size splicer fitting kit per the instructions, between the remaining section and new section of hose and install the other end of the hose on the fitting. Align fittings so that there will be no twist in the hose when it is on the vehicle (see Figure 4). See Table A for parts applications.

d. Install two service clamps at a splice and one at a fitting as in Step #6 of the Clamp Replacement Procedure.

e. Perform Steps #7 and #8 of the Claim Replacement procedure.

5. If the entire section of hose is being replaced:

a. Cut the old hose off of both fittings.

b. Install a new section of hose of the same inside diameter and cut to the same length and install it on fittings. Align fittings so that there will be no twist in the hose when it is on the vehicle. See Table A for parts applications.

c. Install a service clamp at each end as in Step #6 of the Clamp Replacement Procedure.

d. Perform Steps #7 and #8 of the Clamp Replacement Procedure. TABLE A

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Hose Roll

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* Hoses in this list which are of the same inside diameter and roll length are interchangeable. Different part numbers denote different manufacturer sources in these cases.

Fluid Pressure Sensor/Switch: Description and Operation

Description

A pressure sensitive switch is screwed through the rear face of the valve body assembly into the direct clutch oil passage. This switch is closed (grounded) in all but direct drive and reverse, since there is no oil pressure in this passage in Neutral, First or Second gear. The pressure switch is connected by a wire to a transmission connector and hence through an engine solenoid valve to the distributor and engine thermoswitch. When this circuit is grounded (switch closed), spark advance is retarded.

When the transmission shifts to high gear (or reverse), oil pressure in the direct clutch passage will open the switch and circuit so that the transmission will no longer affect the vacuum advance of the distributor.

Line Pressure Regulator

Regulates line pressure according to pump speed and engine torque.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Transmission and Drivetrain > Sensors and Switches - A/T > Shift Interlock Switch > Component Information > Technical Service Bulletins > Customer Interest for Shift Interlock Switch: > 914598A > Dec > 91 > Backup Lamps/Tailgate Window Release - Inoperative

Shift Interlock Switch: Customer Interest Backup Lamps/Tailgate Window Release - Inoperative

Number: 91-459-8A

Section: 8A

Date: DEC. 1991

Corporate Bulletin No.: 168104

ASE No.: A6

Subject: BACKUP LAMPS OR TAILGATE WINDOW RELEASE INOPERATIVE

Model and Year: 1980-91 ALL LIGHT DUTY TRUCKS (EXCEPT GEO)

Owners of some 1980-1991 C/K, 1982-1991 G, 1985-1991 M/L, 1984-1991 P2,P3, 1987-1991 R/V, 1983- 1991 ST (including LLV) with automatic transmissions may comment on a condition of inoperative back-up lamps or inoperative tailgate window release. This condition occurs when the vehicle's gear shift lever is placed in the "reverse" position, but the back-up lamps do not illuminate. In addition, on the S/T utility vehicles, the electric tailgate window release does not release when the transmission gear shift lever is placed in the "park" or "neutral" position and the endgate window release button is depressed. The park/neutral and back-up lamp switch comes out of adjustment which does not allow for the contact points to remain engaged.

To correct these conditions, the contact carrier on the park/neutral and back-up lamp switch has been modified to increase switch carrier travel.

SERVICE PROCEDURE:

1. Disconnect the battery ground cable from the battery.

2. Disconnect the switch assembly harness.

3. Place the gear selector in neutral.

4. Squeeze the tangs on the switch together and remove the switch assembly.

5. Install the new switch assembly (P/N 15679680) by:

-aligning the actuator with the cutout in the steering column jacket. -inserting the tangs into the rectangular holes and pushing

down on the switch assembly.

6. Adjust the switch by moving the gear selector to park.

7. Connect the switch assembly harness.

8. Connect the negative battery cable.

9. Check for proper switch operation. Readjust the switch as necessary.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Sensors and Switches > Sensors and Switches - Transmission and Drivetrain > Sensors and Switches - A/T > Shift Interlock Switch > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Shift Interlock Switch: > 914598A > Dec > 91 > Backup Lamps/Tailgate Window Release - Inoperative

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8. Connect the negative battery cable.

9. Check for proper switch operation. Readjust the switch as necessary.

Wiper Switch: Service and Repair In-Dash Switch Applications

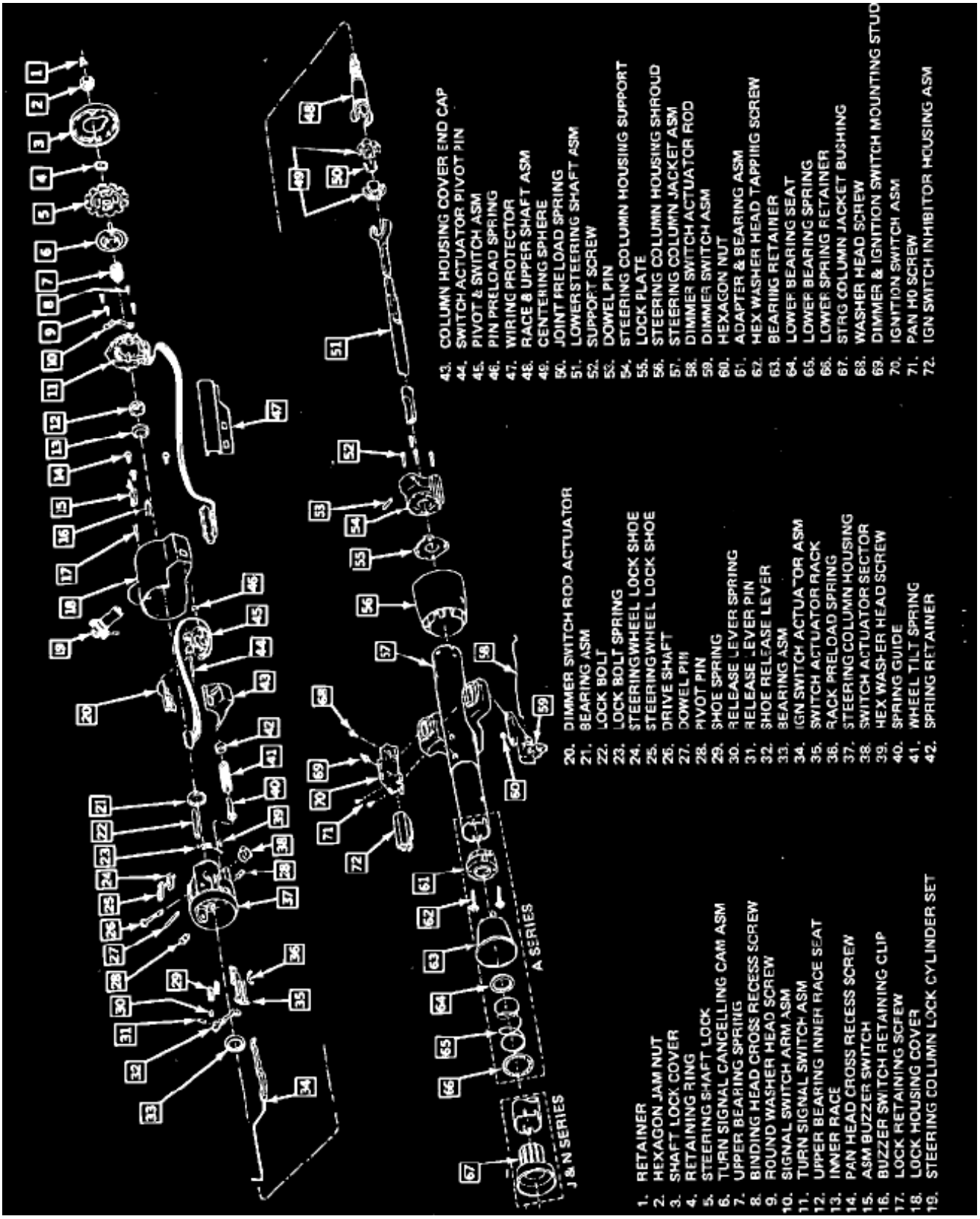
1980---85 G MODELS

1. Disconnect battery ground cable.

2. Working from behind left side of instrument panel, disconnect electrical connector from switch, then remove switch to bezel mounting screws.

3. Remove wiper/washer switch.

4. Reverse procedure to install, ensuring ground wires are attached properly to switch.


1. RETAINER
2. HEXAGON JAM NUT
3. SHAFT LOCK COVER
4. RETAINING RING
5. STEERING SHAFT LOCK
6. TURN SIGNAL CANCELLING CAM ASM
7. UPPER BEARING SPRING
8. BINDING HEAD CROSS RECESS SCREW
9. ROUND WASHER HEAD SCREW
10. SIGNAL SWITCH ARM ASM
11. TURN SIGNAL SWITCH ASM
12. UPPER BEARING INNER RACE SEAT
13. INNER RACE
14. PAN HEAD CROSS RECESS SCREW
15. ASM BUZZER SWITCH
16. BUZZER SWITCH RETAINING CLIP
17. LOCK RETAINING SCREW
18. LOCK HOUSING COVER
19. STEERING COLUMN LOCK CYLINDER SET
20. DIMMER SWITCH ROD ACTUATOR
21. BEARING ASM
22. LOCK BOLT
23. LOCK BOLT SPRING
24. STEERING WHEEL LOCK SHOE
25. STEERING WHEEL LOCK SHOE
26. DRIVE SHAFT
27. DOWEL PIN
28. PIVOT PIN
29. SHOE SPRING
30. RELEASE LEVER SPRING
31. RELEASE LEVER PIN
32. SHOE RELEASE LEVER
33. BEARING ASM
34. IGN SWITCH ACTUATOR ASM
35. SWITCH ACTUATOR RACK
36. RACK PRELOAD SPRING
37. STEERING COLUMN HOUSING
38. SWITCH ACTUATOR SECTOR
39. HEX WASHER HEAD SCREW
40. SPRING GUIDE
41. WHEEL TILT SPRING
42. SPRING RETAINER
43. COLUMN HOUSING COVER END CAP
44. SWITCH ACTUATOR PIVOT PIN
45. PIVOT & SWITCH ASM
46. PIN PRELOAD SPRING
47. WIRING PROTECTOR
48. RACE & UPPER SHAFT ASM
49. CENTERING SPHERE
50. JOINT PRELOAD SPRING
51. LOWER STEERING SHAFT ASM
52. SUPPORT SCREW
53. DOWEL PIN
54. STEERING COLUMN HOUSING SUPPORT
55. LOCK PLATE
56. STEERING COLUMN HOUSING SHROUD
57. STEERING COLUMN JACKET ASM
58. DIMMER SWITCH ACTUATOR ROD
59. DIMMER SWITCH ASM
60. HEXAGON NUT
61. ADAPTER & BEARING ASM
62. HEX WASHER HEAD TAPPING SCREW
63. BEARING RETAINER
64. LOWER BEARING SEAT
65. LOWER BEARING SPRING
66. LOWER SPRING RETAINER
67. STRG COLUMN JACKET BUSHING
68. WASHER HEAD SCREW
69. DIMMER & IGNITION SWITCH MOUNTING STUD
70. IGNITION SWITCH ASM
71. PAN HD SCREW
72. IGN SWITCH INHIBITOR HOUSING ASM
J & N SERIES
A SERIES

Wiper Switch: Service and Repair In-Column Switch Applications

Switch Removal

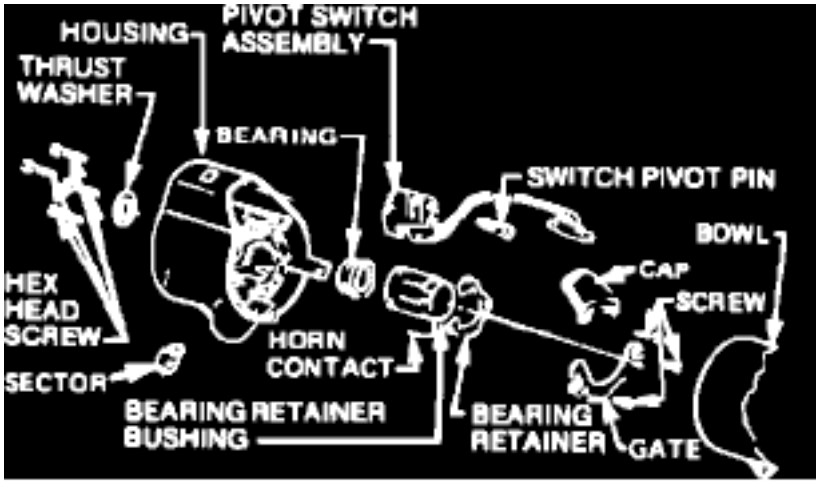
Typical Steering Column Image Shown For Illustrative Purposes Only. Your Column Will Differ.

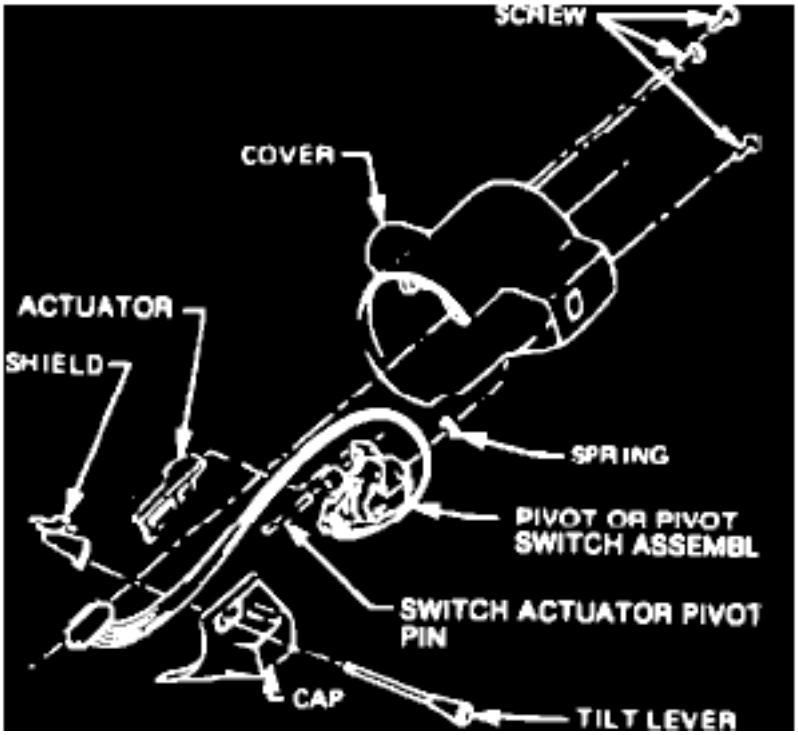
NOTE: The column mounted wiper switch is operated by rotating the turn signal lever or the combination turn signal/cruise control switch (if equipped). Refer to the article about removing the turn signal/cruise control lever if it becomes necessary to completely remove the turn signal/cruise control switch and harness.

REMOVE OR DISCONNECT

1. Disconnect the turn signal/cruise control harness connector at the bottom of the steering column.
2. Remove turn signal lever by pulling it out of the detent retaining clip inside the steering column. Hang the lever from the harness while

disassembling the rest of the column.





3. Disassemble steering column as necessary to remove lock housing. 4. Remove base plate, turn signal switch, ignition lock, dimmer switch, as necessary. 5. Remove the switch retaining pin and the switch.

INSTALL OR CONNECTOR

1. Install the switch retaining pin and the switch. 2. Install base plate, turn signal switch, ignition lock, dimmer switch, as necessary. 3. Assemble steering column as necessary to remove lock housing. 4. Reinstall the turn signal/cruise control lever into the detent retaining clip inside the steering column. 5. Reconnect the turn signal/cruise control harness connector at the bottom of the

steering column.

Multi-Function Lever Replacement

Typical Image Shown For Illustrative Purposes Only (w/standard column).

Typical Image Shown For Illustrative Purposes Only (w/Tilt column).

NOTE: The engagement switch, mounted on the turn signal lever, cannot be serviced. The complete turn signal lever must be removed as an assembly. If the pull-wire breaks or the wire cannot be removed, it will be necessary to disassemble the steering column to string the wire harness.

REMOVE OR DISASSEMBLE

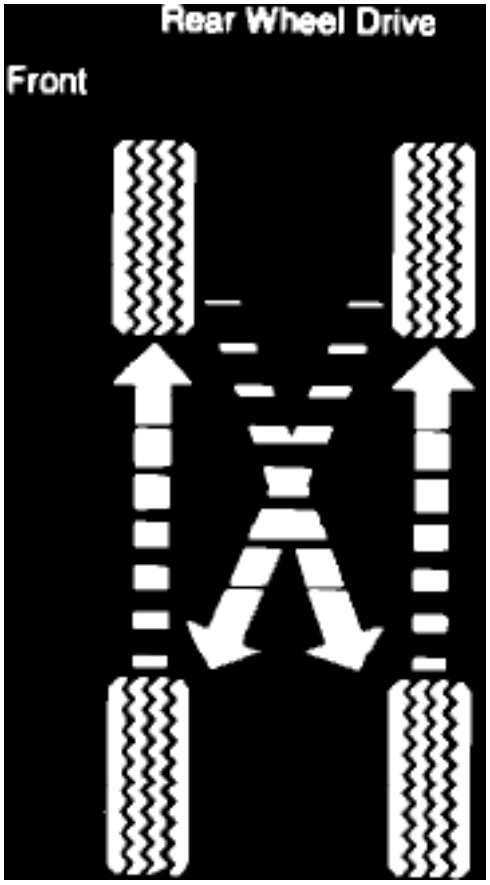
1. Disconnect battery ground cable. 2. Remove steering column lower cover and remove protective cover (26) securing wire to column. 3. Disconnect cruise control switch connector and attach a suitable piece of wire to switch connector. 4. Remove turn signal lever by pulling it out of the detent retaining clip inside the steering column. On some models, it may be necessary to

remove steering wheel and lock cover to guide the wire through the column.

5. Pull harness up gently so guide wire can be used to install new unit.

INSTALL OR CONNECT

1. Connect the new harness to the guide wire. 2. Place tape over the connector to make it easier to pull through the steering column. 3. Install the turn signal lever into the detent retaining clip inside the steering column. 4. Disconnect the guide wire from the cruise control switch connector and reconnect. 5. Install protective cover (26) around the cruise control switch harness. 6. Reinstall steering column lower cover. 7. Reconnect battery ground cable.



Alignment: Customer Interest Tires, Front - Premature Wear on RWD Vehicles

86-13 3 DEC., 1985

Subject: FRONT POSITION TIRE WEAR ON REAR WHEEL DRIVE VEHICLES, AND ALL WEATHER TIRES

Model and Year: ALL REAR WHEEL DRIVE VEHICLES PASSENGER CARS AND LIGHT DUTY TRUCKS TO:

ALL CHEVROLET DEALERS

Some rear wheel drive vehicles may exhibit premature tire wear on the front wheel positions. The wear usually starts on the outer tread row and may progress across the full tread. This wear also usually appears as a heel and toe (high and low) wear pattern on individual tread blocks which can eventually lead to tire noise and/or tire roughness.

Rear Wheel Drive

Small amounts of heel/toe wear on the outer tread is considered normal. This wear is characteristic of new tires at full tread depth on free-rolling axles. Turning and cornering exaggerates front tire wear. Routine tire rotation at 7,500 miles using the modified 'X' method* as shown in the Owners Manual will minimize the wear. Such tires can be expected to give optimum performance for their full intended life.

If this type of wear becomes excessive and/or results in a customer inquiry, the following procedure should be followed:

1) Rotate tires using the modified 'X' pattern* shown. This allows the front tires to rotate in the opposite direction on the rear of the vehicle which will tend to even out any irregular wear quicker. It also allows all four tires to eventually run on all four positions. Tire noise may continue after rotation, but should gradually lessen after a few thousand miles.

2) Measure front alignment. The single most contributing cause of premature tire wear, except for abusive driving, is excessive toe. For best tire wear, reset toe as close to zero as the specification allows. In most cases, this will be .1~ total toe or less. Camber and caster should also be set to specification if necessary.

3) Talk to the customer about his/her tires. Explain that some amount of shoulder wear on front tires is normal and will even out with regular tire rotation. Explain that front tire shoulder wear is also exagger-

ated by hard cornering. Stress the importance of proper inflation pressure and alignment.

4. If the wear has advanced far enough, tire replacement may become necessary. When installing new tires, match the tire's high point mark to the wheel's valve and then balance. Also, alignment must be reset as specified in Step 2 above and the customer instructed to follow the modified 'X' rotation schedule at 7,500 miles.

*The modified 'X' rotation pattern does not apply to some models, such as Corvettes, Camaros, and Firebirds equipped with directional tires and/or special wheels.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Alignment > System Information > Technical Service Bulletins > All Technical Service Bulletins for Alignment: > 05-03-07-009C > Dec > 10 > Steering/Suspension - Wheel Alignment Specifications

WARRANTY ADMINISTRATION

Bulletin No.: 05-03-07-009C

Date: December 09, 2010

Subject: Wheel Alignment Specifications, Requirements and Recommendations for GM Vehicles

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks

Supercede: This bulletin is being extensively revised to provide technicians and warranty administrators with an all inclusive guide for wheel alignments. PLEASE FAMILIARIZE YOURSELF WITH THESE UPDATES BEFORE PERFORMING YOUR NEXT GM WHEEL ALIGNMENT SERVICE. Please discard Corporate Bulletin Number 05-03-07-009B (Section 03 - Suspension).

Purpose

The purpose of this bulletin is to provide retail, wholesale and fleet personnel with General Motors' warranty service requirements and recommendations for customer concerns related to wheel alignment. For your convenience, this bulletin updates and centralizes all of GM's Standard Wheel Alignment Service Procedures, Policy Guidelines and bulletins on wheel alignment warranty service.

Important PLEASE FAMILIARIZE YOURSELF WITH THESE UPDATES BEFORE PERFORMING YOUR NEXT GM WHEEL ALIGNMENT SERVICE.

The following five (5) key steps are a summary of this bulletin and are REQUIRED in completing a successful wheel alignment service.

1. Verify the vehicle is in an Original Equipment condition for curb weight, tires, wheels, suspension and steering configurations. Vehicles

modified in any of these areas are not covered for wheel alignment warranty.

2. Review the customer concern relative to "Normal Operation" definitions. 3. Verify that vehicle is within the "Mileage Policy" range. 4. Document wheel alignment warranty claims appropriately for labor operations E2000 and E2020.

The following information must be documented or attached to the repair order:

- Customer concern in detail

- What corrected the customer concern?

- If a wheel alignment is performed:

- Consult SI for proper specifications.

- Document the "Before" AND "After" wheel alignment measurements/settings.

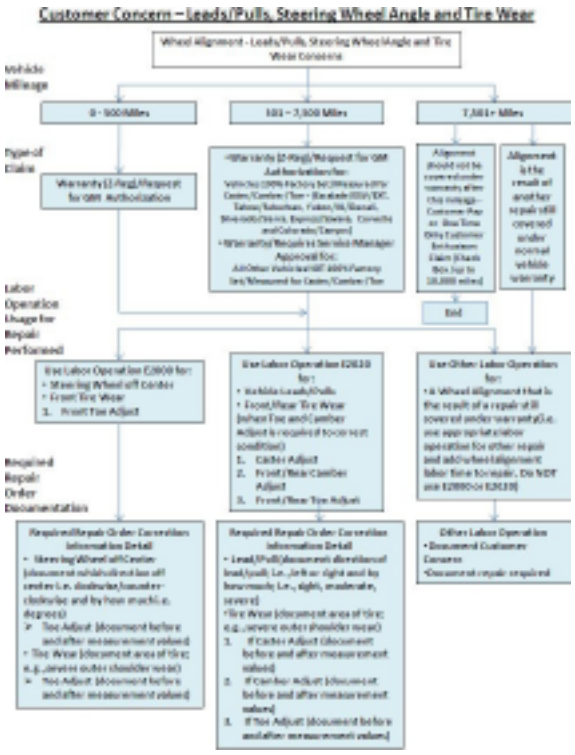
- Completed "Wheel Alignment Repair Order Questionnaire" (form attached to this bulletin)

5. Use the proper wheel alignment equipment (preferred with print-out capability), process and the appropriate calibration maintenance schedules.

Important If it is determined that a wheel alignment is necessary under warranty, use the proper labor code for the repair. E2000 for Steering Wheel Angle and/or Front Toe set or E2020 for Wheel Alignment Check/Adjust includes Caster, Camber and Toe set (Wheel alignment labor time for

other component repairs is to be charged to the component that causes a wheel alignment operation.).

The following flowchart is to help summarize the information detailed in this bulletin and should be used whenever a wheel alignment is performed.



Verify Original Equipment Condition of the Vehicle

- Verify that Original Equipment Tires and Wheels or Official GM Accessory Tires and Wheels are on the vehicle.

- Verify that aftermarket suspension "Lift" or "Lowering" Kits or other suspension alterations have NOT been done to the vehicle.

- Check for accidental damage to the vehicle; for example, severe pothole or curb impacts, collision damage that may have affected the wheel alignment of the vehicle; e.g., engine cradles, suspension control arms, axles, wheels, wheel covers, tires may show evidence of damage/impact.

- Check to be sure vehicle has seen "Normal Use" rather than abuse; e.g., very aggressive driving may show up by looking at the tires and condition of the vehicle.

- Check for other additional equipment items that may significantly affect vehicle mass such as large tool boxes, campers, snow plow packages (without the snowplow RPO), etc., especially in trucks and cutaway/incomplete vehicles. Significant additional mass can affect trim height and wheel alignment of the vehicle and may necessitate a customer pay wheel alignment when placed semi-permanently in the vehicle (Upfitter instructions are to realign the vehicle after placement of these types of items. (This typically applies to trucks and incomplete vehicles that can be upfit with equipment such as the above.)

Customer Concerns, "Normal Operation" Conditions and "Mileage Policy"

Possible Concerns

The following are typical conditions that may require wheel alignment warranty service:

1. Lead/Pull: defined as "at a constant highway speed on a typical straight road, the amount of effort required at the steering wheel to maintain the

vehicle's straight heading."

Important Please evaluate for the condition with hands-on the steering wheel. Follow the "Vehicle Leads/Pulls" diagnostic tree located in SI to determine the cause of a lead/pull concern. Lead/Pull concerns can be due to road crown or road slope, tires, wheel alignment or even in rare circumstances a steering gear issue. Lead/pull concerns due to road crown are considered "Normal Operation" and are NOT a warrantable condition -- the customer should be advised that this is "Normal Operation."

Important Some customers may comment on a "Lead/Pull" when they hold the steering wheel in a level condition. If so, this is more likely a "steering wheel angle" concern because the customer is "steering" the vehicle to obtain a "level" steering wheel.

2. Steering wheel angle to the left or right (counter-clockwise or clockwise, respectively): Defined as the steering wheel angle (clocking)

deviation from "level" while maintaining a straight heading on a typical straight road.

3. Irregular or Premature tire wear: Slight to very slight "feathering" or "edge" wear on the shoulders of tires is NOT considered unusual and

should even out with a tire rotation; if the customer is concerned about a "feathering" condition of the tires, the customer could be advised to rotate the tires earlier than the next scheduled mileage/maintenance interval (but no later than the next interval). Be sure to understand the customer's driving habits as this will also heavily influence the tire wear performance; tire wear from aggressive or abusive driving habits is NOT a warrantable condition.

Important Slight or mild feathering, cupping, edge or heel/toe wear of tire tread shoulders is "normal" and can show up very early in a tire/vehicle service mileage; in fact, some new tires can show evidence of feathering from the factory. These issues do NOT affect the overall performance and tread life of the tire. Dealer personnel should always check the customer's maintenance records to ensure that tire inflation pressure is being maintained to placard and that the tires are being rotated (modified-X pattern) at the proper mileage intervals. Wheel alignments are NOT to be performed for the types of "Normal" Tire Feathering shown in Figures 1-4 below.

Figure 1: Full Tread View - "NORMAL" Tire "Feathering" Wear on the Shoulder/Adjacent/Center Ribs

Figure 2: Tire Shoulder View Example 1 - "NORMAL" Tire "Feathering" Wear on the Shoulder

Figure 3: Tire Shoulder View Example 2 - "NORMAL" Tire "Feathering" Wear

Figure 4: Detail Side View of Tire Shoulder Area - "NORMAL" Tire "Feathering" Wear

Important When a wheel alignment is deemed necessary for tire wear, be sure to document on the repair order, in as much detail as possible, the severity and type of tire wear (e.g., severe center wear or severe inside or outside shoulder wear) and the position of the tire on the vehicle (RF, LF, LR, RR). Please note the customer's concern with the wear such as, noise, appearance, wear life, etc. A field product report with pictures of the tire wear condition is recommended. Refer to Corporate Bulletin Number 02-00-89-002J and #07-00-89-036C.

4. Other repairs that affect wheel alignment; e.g., certain component replacement such as suspension control arm replacement, engine cradle

adjustment/replace, steering gear replacement, steering tie rod replace, suspension strut/shock, steering knuckle, etc. may require a wheel alignment.

Important If other components or repairs are identified as affecting the wheel alignment, policy calls for the wheel alignment labor time to be charged to the replaced/repaired component's labor operation time rather than the wheel alignment labor operations.

Important Vibration type customer concerns are generally NOT due to wheel alignment except in the rare cases; e.g., extreme diagonal wear across the tread. In general, wheel alignments are NOT to be performed as an investigation/correction for vibration concerns.

"Normal Operation" Conditions

Vehicle Lead/Pull Due to Road Crown or Slope:

As part of "Normal Operation," vehicles will follow side-to-side or left to right road crown or slope. Be sure to verify from the customer the types of roads they are driving as they may not recognize the influence of road crown on vehicle lead/pull and steering wheel angle. If a vehicle requires significant steering effort to prevent it from "climbing" the road crown there may be an issue to be looked into further.

Important

A wheel alignment will generally NOT correct vehicles that follow the road crown since this is within "Normal Operation."

Mileage Policy

The following mileage policy applies for E2020 and E2000 labor operations: Note

Wheel Alignment is NOT covered under the New Vehicle Limited Warranty for Express and Savana Cutaway vehicles as these vehicles require Upfitters to set the wheel alignment after completing the vehicles.

- 0-800 km (0-500 mi): E2000/E2020 claims ONLY allowed with Call Center Authorization. Due to the tie down during shipping, the vehicle's suspension requires some time to reach normal operating position. For this reason, new vehicles are generally NOT to be aligned until they have accumulated at least 800 km (500 mi). A field product report should accompany any claim within this mileage range.

- 801-12,000 km (501-7,500 mi):

- If a vehicle came from the factory with incorrect alignment settings, any resulting off-angle steering wheel, lead/pull characteristics or the rare occurrence of excessive tire wear would be apparent early in the life of the vehicle. The following policy applies:

- Vehicles 100% Factory Set/Measured for Caster/Camber/Toe - Escalade/ESV/EXT, Tahoe/Suburban, Yukon/XL/Denali, Silverado/Sierra, Express/Savana, Corvette and Colorado/Canyon: E2000/E2020 Claims: Call Center Authorization Required

- All Vehicles NOT 100% Factory Set/Measured for Caster/Camber/Toe as noted above: E2000/E2020 Claims: Dealer Service Manager Authorization Required

- 12,001 km and beyond (7,501 miles and beyond): During this period, customers are responsible for the wheel alignment expense or dealers may provide on a case-by case basis a one-time customer enthusiasm claim up to 16,000 km (10,000 mi). In the event that a defective component required the use of the subject labor operations, the identified defective component labor operation will include the appropriate labor time for a wheel alignment as an add condition to the component repair.

Important Only one wheel alignment labor operation claim (E2000 or E2020) may be used per VIN.

Warranty Documentation Requirements

When a wheel alignment service has been deemed necessary, the following items will need to be clearly documented on/with the repair order:

- Customer concern in detail

- What corrected the customer concern?

- If a wheel alignment is performed:

- Consult SI for proper specifications.

- Document the "Before" AND "After" wheel alignment measurements/settings.

- Completed "Wheel Alignment Repair Order Questionnaire" (form attached to this bulletin)

1. Document the customer concern in as much detail as possible on the repair order and in the warranty administration system. Preferred examples:

- Steering wheel is off angle in the counterclockwise direction by approximately x degrees or clocking position.

- Vehicle lead/pulls to the right at approximately x-y mph. Vehicle will climb the road crown. Severe, Moderate or Slight.

- RF and LF tires are wearing on the outside shoulders with severe feathering.

Important In the event of a lead/pull or steering wheel angle concern, please note the direction of lead/pull (left or right) or direction of steering wheel angle (clockwise or counterclockwise) on the repair order and within the warranty claim verbatim.

Important In the event of a tire wear concern, please note the position on the vehicle and where the wear is occurring on the tire; i.e., the RF tire is wearing on the inside shoulder.

2. Document the technician's findings on cause and correction of the issue. Examples:

- Reset LF toe from 0.45 degrees to 0.10 degrees and RF toe from -0.25 degrees to 0.10 degrees to correct the steering wheel angle from 5 degrees counterclockwise to 0 degrees.

- Reset LF camber from 0.25 degrees to -0.05 degrees to correct the cross-camber condition of +0.30 degrees to 0.00 degrees on the vehicle.

- Front Sum toe was found to be 0.50 degrees, reset to 0.20 degrees.

3. Print-out the "Before" and "After" wheel alignment measurements/settings and attach them to the Repair Order or if print-out capability is not

available, measurements may also be clearly and legibly handwritten into the Wheel Alignment Repair Order Questionnaire attached to this bulletin.

4. Attach the Wheel Alignment Repair Order Questionnaire below along with the print-out of "Before" and "After" wheel alignment measurements to

the Repair Order and retain for use by GM.

Wheel Alignment Equipment and Process

Wheel alignments must be performed with a quality machine that will give accurate results when performing checks. "External Reference" (image-based camera technology) is preferred. Please refer to Corporate Bulletin Number 05-00-89-029B: General Motors Dealership Critical Equipment Requirements and Recommendations.

Requirements:

- Computerized four wheel alignment system.

- Computer capable of printing before and after alignment reports.

- Computer capable of time and date stamp printout.

- Racking system must have jacking capability

- Racking system must be capable of level to 1.6 mm (1/16 in)

- Appropriate wheel stops and safety certification

- Built-in turn plates and slip plates

- Wheel clamps capable of attaching to 20" or larger wheels

- Racking capable of accepting any GM passenger car or light duty truck

- Operator properly trained and ASE-certified (U.S. only) in wheel alignment

Recommendations:

Racking should have front and rear jacking capability.

Equipment Maintenance and Calibration:

Alignment machines must be regularly calibrated in order to give correct information. Most manufacturers recommend the following:

- Alignment machines with "internal reference" sensors should be checked (and calibrated, if necessary) every six months.

- Alignment machines with "external reference" (image-based camera technology) should be checked (and calibrated, if necessary) once a year.

- Racks must be kept level to within 1.6 mm (1/16 in).

- If any instrument that is part of the alignment machine is dropped or damaged in some way, check the calibration immediately.

Check with the manufacturer of your specific equipment for their recommended service/calibration schedule.

Wheel Alignment Process

When performing wheel alignment measurement and/or adjustment, the following steps should be taken:

Preliminary Steps:

1. Verify that the vehicle has a full tank of fuel (compensate as necessary). 2. Inspect the wheels and the tires for damage. 3. Inspect the tires for the proper inflation and irregular tire wear. 4. Inspect the wheel bearings for excessive play. 5. Inspect all suspension and steering parts for looseness, wear, or damage. 6. Inspect the steering wheel for excessive drag or poor return due to stiff or rusted linkage or suspension components. 7. Inspect the vehicle trim height. 8. Compensate for frame angle on targeted vehicles (refer to Wheel Alignment Specifications in SI).

Satisfactory vehicle operation may occur over a wide range of alignment angles. However, if the wheel alignment angles are not within the range of specifications, adjust the wheel alignment to the specifications. Refer to Wheel Alignment Specifications in SI. Give consideration to excess loads, such as tool boxes, sample cases, etc. Follow the wheel alignment equipment manufacturer's instructions.

Measure/Adjust:

Important Prior to making any adjustments to wheel alignment on a vehicle, technicians must verify that the wheel alignment specifications loaded into their wheel alignment machine are up-to-date by comparing these to the wheel alignment specifications for the appropriate model and model year in SI. Using incorrect and/or outdated specifications may result in unnecessary adjustments, irregular and/or premature tire wear and repeat customer concerns

Important When performing adjustments to vehicles requiring a 4-wheel alignment, set the rear wheel alignment angles first in order to obtain proper front wheel alignment angles.

Perform the following steps in order to measure the front and rear alignment angles:

1. Install the alignment equipment according to the manufacturer's instructions. 2. Jounce the front and the rear bumpers 3 times prior to checking the wheel alignment. 3. Measure the alignment angles and record the readings.

If necessary, adjust the wheel alignment to vehicle specification and record the before and after measurements. Refer to Wheel Alignment Specifications in SI.

Important Technicians must refer to SI for the correct wheel alignment specifications. SI is the only source of GM wheel alignment specifications that is kept up-to-date throughout the year.

Test drive vehicle to ensure proper repair.

Wheel Alignment Repair Order Questionnaire

Note
Please fill in the blanks. Additional help can be found in the "Vehicle Lead/Pull Diagnostics" located in SI under Suspension - General Diagnosis.

Servicing Dealer:

Phone Number:

VIN_____

Technician Name:

Date:

Model:

Year:

Odometer:

_____

TAC Case # if applicable:

Vehicle Concern Information

Customer Concern:

Tire Wear____ Steering Wheel Off-Angle___
Lead/Pull____ Other _____

Was the customer concern duplicated? Yes___ No___
Is the tire pressure within +/- 3 psi of the tire placard? Yes___ No___
If No, record the tire pressures (psi):
LF____ RF____ LR____ RR____

Tire Wear (If Applicable)
Please check all boxes that apply:
Left Front Tire:
Even Wear___ Inside Shoulder___
Center___ Outside Shoulder___ Cupping/Feathering___

Right Front Tire:
Even Wear___ Inside Shoulder___
Center___ Outside Shoulder___ Cupping/Feathering___

Left Rear Tire:
Even Wear___ Inside Shoulder___
Center___ Outside Shoulder___ Cupping/Feathering___

Right Rear Tire:
Even Wear___ Inside Shoulder___
Center___ Outside Shoulder___ Cupping/Feathering___

Steering Wheel Off-Angle (If Applicable)
Which way was the steering wheel off angle?

Lead/Pull (If Applicable)

Which way does the vehicle lead or pull? Right___ Left___

Were the front tires swapped side to side? Yes___ No___

Was the vehicle checked for brake drag? Yes___ No___

Was the steering gear checked for unbalance?

	Left Front		Right Front		Left Rear		Right Rear	
	Before	After	Before	After	Before	After	Before	After
Toe:								
Camber:								
Caster:					XXXXX	XXXXX	XXXXX	XXXXX
Z/D-Height								

Frame Angle Measurement (Express / Savana Only) .....

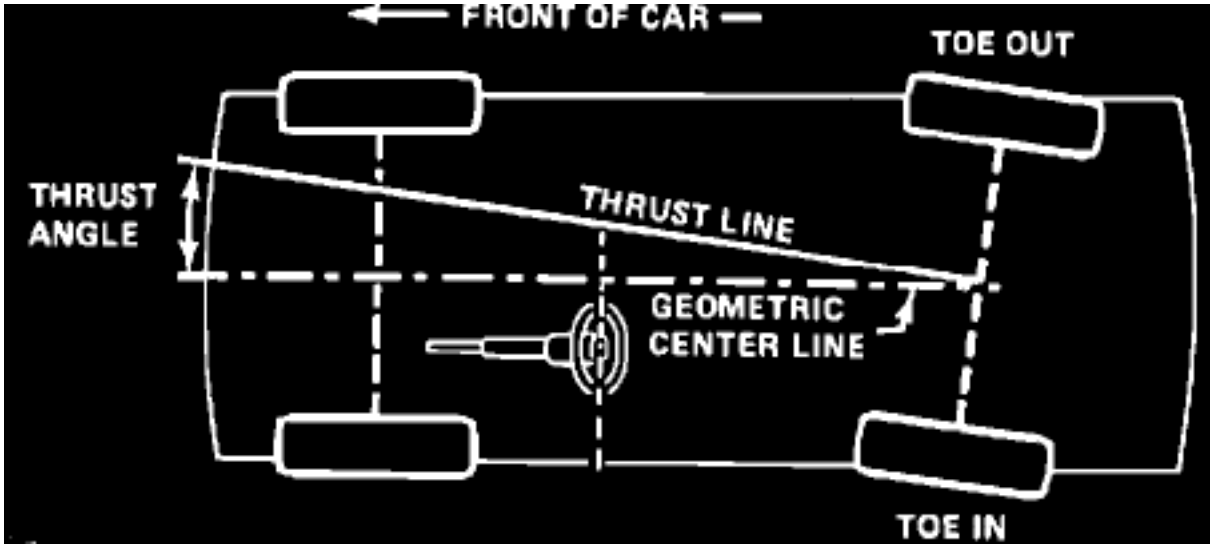
GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

What corrected the customer concern and was the repair verified?

Please Explain: .....

Disclaimer



Alignment: All Technical Service Bulletins Alignment - The Importance of Four Wheel Alignment

Number: 89-01-3A

Section: 3A

Date: SEPT., 1988

Subject: THE IMPORTANCE OF FOUR WHEEL ALIGNMENT

Model and Year: 1979-89 ALL CHEVROLET MODELS

TO: ALL CHEVROLET DEALERS

In which direction will the vehicle pictured below travel if the steering wheel is straight ahead? The vehicle will track to the left because of the directional forces created by the rear wheels and tires. This directional force is called the "thrust angle". The front wheels aim or steer the vehicle but the rear wheels control tracking and assist in directing the car.

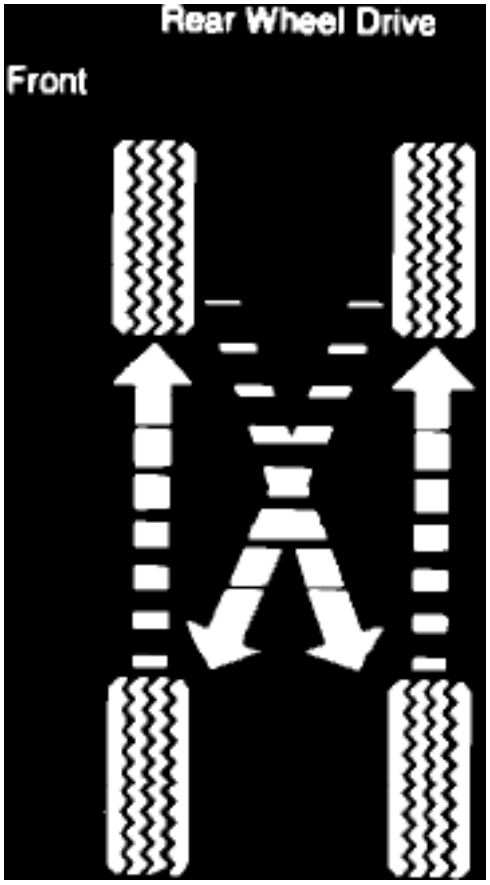
What might the driver comment about?

In the illustration, the driver may comment about the steering wheel being off center when going straight down the road. This would be true because of the added input required at the steering wheel to offset the thrust angle force caused by the rear wheels not tracking the front wheels to the geometric center line of the vehicle. The driver may also comment about unusual tire wear, not precise handling characteristics and even decreased fuel economy.

A four wheel alignment allows the technician to measure the toe of each rear wheel to determine if the rear wheels are tracking the geometric center line of the car. Ideally the geometric center line will be the same as the thrust line. In the example in Figure 1, the thrust line has shifted to the right because the rear wheel toe is not tracking the front wheels. This can occur on both or on one rear wheel.

On some vehicles the rear toe is adjustable; other models may require component straightening or replacement or shims. Once the rear toe is properly adjusted or set, the front wheel toe can be set so all four wheels are tracking the geometric center line of the vehicle. This will provide optimum

tire wear, handling and fuel economy characteristics for the vehicle.



Alignment: All Technical Service Bulletins Tires, Front - Premature Wear on RWD Vehicles

86-13 3 DEC., 1985

Subject: FRONT POSITION TIRE WEAR ON REAR WHEEL DRIVE VEHICLES, AND ALL WEATHER TIRES

Model and Year: ALL REAR WHEEL DRIVE VEHICLES PASSENGER CARS AND LIGHT DUTY TRUCKS TO:

ALL CHEVROLET DEALERS

Some rear wheel drive vehicles may exhibit premature tire wear on the front wheel positions. The wear usually starts on the outer tread row and may progress across the full tread. This wear also usually appears as a heel and toe (high and low) wear pattern on individual tread blocks which can eventually lead to tire noise and/or tire roughness.

Rear Wheel Drive

Small amounts of heel/toe wear on the outer tread is considered normal. This wear is characteristic of new tires at full tread depth on free-rolling axles. Turning and cornering exaggerates front tire wear. Routine tire rotation at 7,500 miles using the modified 'X' method* as shown in the Owners Manual will minimize the wear. Such tires can be expected to give optimum performance for their full intended life.

If this type of wear becomes excessive and/or results in a customer inquiry, the following procedure should be followed:

1) Rotate tires using the modified 'X' pattern* shown. This allows the front tires to rotate in the opposite direction on the rear of the vehicle which will tend to even out any irregular wear quicker. It also allows all four tires to eventually run on all four positions. Tire noise may continue after rotation, but should gradually lessen after a few thousand miles.

2) Measure front alignment. The single most contributing cause of premature tire wear, except for abusive driving, is excessive toe. For best tire wear, reset toe as close to zero as the specification allows. In most cases, this will be .1~ total toe or less. Camber and caster should also be set to specification if necessary.

3) Talk to the customer about his/her tires. Explain that some amount of shoulder wear on front tires is normal and will even out with regular tire rotation. Explain that front tire shoulder wear is also exagger-

ated by hard cornering. Stress the importance of proper inflation pressure and alignment.

4. If the wear has advanced far enough, tire replacement may become necessary. When installing new tires, match the tire's high point mark to the wheel's valve and then balance. Also, alignment must be reset as specified in Step 2 above and the customer instructed to follow the modified 'X' rotation schedule at 7,500 miles.

*The modified 'X' rotation pattern does not apply to some models, such as Corvettes, Camaros, and Firebirds equipped with directional tires and/or special wheels.

Alignment: All Technical Service Bulletins Wheels - Locking Wheel Nuts Impact On Tire Balance

85-37 3E (X) FEB., 1985 Subject:

LOCKING WHEEL NUTS

Model and Year: ALL

TO: ALL CHEVROLET DEALERS

Whenever a heavier, solid locking wheel nut is used to replace a standard nut, it should be installed nearest the valve stem, and a 1/2 ounce balance weight should be added 180~ opposite the locking nut.

This situation will usually occur on styled wheels. For improved appearance, the balance weight should be installed on the wheel's inboard side.

When rotating tires, always re-install the locking nut nearest the tire valve stem so that it remains opposite the 1/2 ounce balance weight.

This procedure will improve the on-car wheel balance by compensating for the heavy locking wheel nut. This does not apply to the light weight, two-piece locking nuts used on some Chevrolet models.

Alignment: All Technical Service Bulletins Steering/Suspension - Wheel Alignment Specifications

WARRANTY ADMINISTRATION

Bulletin No.: 05-03-07-009C

Date: December 09, 2010

Subject: Wheel Alignment Specifications, Requirements and Recommendations for GM Vehicles

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks

Supercede: This bulletin is being extensively revised to provide technicians and warranty administrators with an all inclusive guide for wheel alignments. PLEASE FAMILIARIZE YOURSELF WITH THESE UPDATES BEFORE PERFORMING YOUR NEXT GM WHEEL ALIGNMENT SERVICE. Please discard Corporate Bulletin Number 05-03-07-009B (Section 03 - Suspension).

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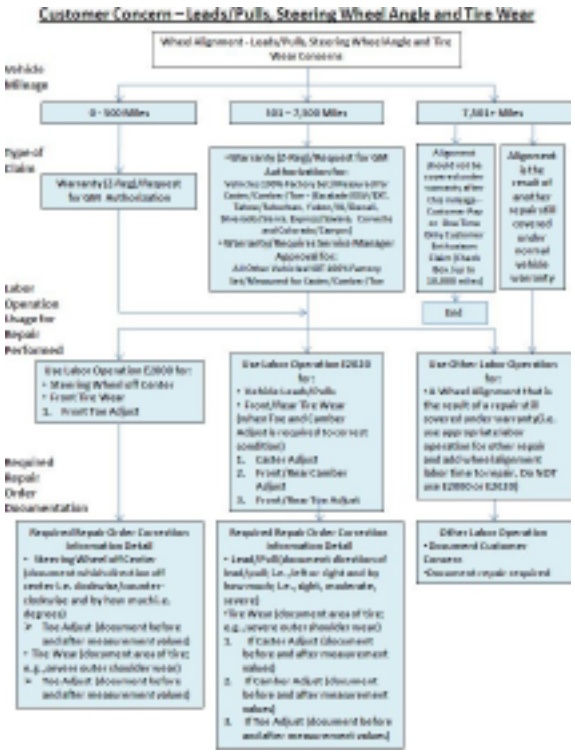

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- Check to be sure vehicle has seen "Normal Use" rather than abuse; e.g., very aggressive driving may show up by looking at the tires and condition of the vehicle.

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The following are typical conditions that may require wheel alignment warranty service:

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Figure 1: Full Tread View - "NORMAL" Tire "Feathering" Wear on the Shoulder/Adjacent/Center Ribs

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Figure 3: Tire Shoulder View Example 2 - "NORMAL" Tire "Feathering" Wear

Figure 4: Detail Side View of Tire Shoulder Area - "NORMAL" Tire "Feathering" Wear

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adjustment/replace, steering gear replacement, steering tie rod replace, suspension strut/shock, steering knuckle, etc. may require a wheel alignment.

Important If other components or repairs are identified as affecting the wheel alignment, policy calls for the wheel alignment labor time to be charged to the replaced/repaired component's labor operation time rather than the wheel alignment labor operations.

Important Vibration type customer concerns are generally NOT due to wheel alignment except in the rare cases; e.g., extreme diagonal wear across the tread. In general, wheel alignments are NOT to be performed as an investigation/correction for vibration concerns.

"Normal Operation" Conditions

Vehicle Lead/Pull Due to Road Crown or Slope:

As part of "Normal Operation," vehicles will follow side-to-side or left to right road crown or slope. Be sure to verify from the customer the types of roads they are driving as they may not recognize the influence of road crown on vehicle lead/pull and steering wheel angle. If a vehicle requires significant steering effort to prevent it from "climbing" the road crown there may be an issue to be looked into further.

Important

A wheel alignment will generally NOT correct vehicles that follow the road crown since this is within "Normal Operation."

Mileage Policy

The following mileage policy applies for E2020 and E2000 labor operations: Note

Wheel Alignment is NOT covered under the New Vehicle Limited Warranty for Express and Savana Cutaway vehicles as these vehicles require Upfitters to set the wheel alignment after completing the vehicles.

- 0-800 km (0-500 mi): E2000/E2020 claims ONLY allowed with Call Center Authorization. Due to the tie down during shipping, the vehicle's suspension requires some time to reach normal operating position. For this reason, new vehicles are generally NOT to be aligned until they have accumulated at least 800 km (500 mi). A field product report should accompany any claim within this mileage range.

- 801-12,000 km (501-7,500 mi):

- If a vehicle came from the factory with incorrect alignment settings, any resulting off-angle steering wheel, lead/pull characteristics or the rare occurrence of excessive tire wear would be apparent early in the life of the vehicle. The following policy applies:

- Vehicles 100% Factory Set/Measured for Caster/Camber/Toe - Escalade/ESV/EXT, Tahoe/Suburban, Yukon/XL/Denali, Silverado/Sierra, Express/Savana, Corvette and Colorado/Canyon: E2000/E2020 Claims: Call Center Authorization Required

- All Vehicles NOT 100% Factory Set/Measured for Caster/Camber/Toe as noted above: E2000/E2020 Claims: Dealer Service Manager Authorization Required

- 12,001 km and beyond (7,501 miles and beyond): During this period, customers are responsible for the wheel alignment expense or dealers may provide on a case-by case basis a one-time customer enthusiasm claim up to 16,000 km (10,000 mi). In the event that a defective component required the use of the subject labor operations, the identified defective component labor operation will include the appropriate labor time for a wheel alignment as an add condition to the component repair.

Important Only one wheel alignment labor operation claim (E2000 or E2020) may be used per VIN.

Warranty Documentation Requirements

When a wheel alignment service has been deemed necessary, the following items will need to be clearly documented on/with the repair order:

- Customer concern in detail

- What corrected the customer concern?

- If a wheel alignment is performed:

- Consult SI for proper specifications.

- Document the "Before" AND "After" wheel alignment measurements/settings.

- Completed "Wheel Alignment Repair Order Questionnaire" (form attached to this bulletin)

1. Document the customer concern in as much detail as possible on the repair order and in the warranty administration system. Preferred examples:

- Steering wheel is off angle in the counterclockwise direction by approximately x degrees or clocking position.

- Vehicle lead/pulls to the right at approximately x-y mph. Vehicle will climb the road crown. Severe, Moderate or Slight.

- RF and LF tires are wearing on the outside shoulders with severe feathering.

Important In the event of a lead/pull or steering wheel angle concern, please note the direction of lead/pull (left or right) or direction of steering wheel angle (clockwise or counterclockwise) on the repair order and within the warranty claim verbatim.

Important In the event of a tire wear concern, please note the position on the vehicle and where the wear is occurring on the tire; i.e., the RF tire is wearing on the inside shoulder.

2. Document the technician's findings on cause and correction of the issue. Examples:

- Reset LF toe from 0.45 degrees to 0.10 degrees and RF toe from -0.25 degrees to 0.10 degrees to correct the steering wheel angle from 5 degrees counterclockwise to 0 degrees.

- Reset LF camber from 0.25 degrees to -0.05 degrees to correct the cross-camber condition of +0.30 degrees to 0.00 degrees on the vehicle.

- Front Sum toe was found to be 0.50 degrees, reset to 0.20 degrees.

3. Print-out the "Before" and "After" wheel alignment measurements/settings and attach them to the Repair Order or if print-out capability is not

available, measurements may also be clearly and legibly handwritten into the Wheel Alignment Repair Order Questionnaire attached to this bulletin.

4. Attach the Wheel Alignment Repair Order Questionnaire below along with the print-out of "Before" and "After" wheel alignment measurements to

the Repair Order and retain for use by GM.

Wheel Alignment Equipment and Process

Wheel alignments must be performed with a quality machine that will give accurate results when performing checks. "External Reference" (image-based camera technology) is preferred. Please refer to Corporate Bulletin Number 05-00-89-029B: General Motors Dealership Critical Equipment Requirements and Recommendations.

Requirements:

- Computerized four wheel alignment system.

- Computer capable of printing before and after alignment reports.

- Computer capable of time and date stamp printout.

- Racking system must have jacking capability

- Racking system must be capable of level to 1.6 mm (1/16 in)

- Appropriate wheel stops and safety certification

- Built-in turn plates and slip plates

- Wheel clamps capable of attaching to 20" or larger wheels

- Racking capable of accepting any GM passenger car or light duty truck

- Operator properly trained and ASE-certified (U.S. only) in wheel alignment

Recommendations:

Racking should have front and rear jacking capability.

Equipment Maintenance and Calibration:

Alignment machines must be regularly calibrated in order to give correct information. Most manufacturers recommend the following:

- Alignment machines with "internal reference" sensors should be checked (and calibrated, if necessary) every six months.

- Alignment machines with "external reference" (image-based camera technology) should be checked (and calibrated, if necessary) once a year.

- Racks must be kept level to within 1.6 mm (1/16 in).

- If any instrument that is part of the alignment machine is dropped or damaged in some way, check the calibration immediately.

Check with the manufacturer of your specific equipment for their recommended service/calibration schedule.

Wheel Alignment Process

When performing wheel alignment measurement and/or adjustment, the following steps should be taken:

Preliminary Steps:

1. Verify that the vehicle has a full tank of fuel (compensate as necessary). 2. Inspect the wheels and the tires for damage. 3. Inspect the tires for the proper inflation and irregular tire wear. 4. Inspect the wheel bearings for excessive play. 5. Inspect all suspension and steering parts for looseness, wear, or damage. 6. Inspect the steering wheel for excessive drag or poor return due to stiff or rusted linkage or suspension components. 7. Inspect the vehicle trim height. 8. Compensate for frame angle on targeted vehicles (refer to Wheel Alignment Specifications in SI).

Satisfactory vehicle operation may occur over a wide range of alignment angles. However, if the wheel alignment angles are not within the range of specifications, adjust the wheel alignment to the specifications. Refer to Wheel Alignment Specifications in SI. Give consideration to excess loads, such as tool boxes, sample cases, etc. Follow the wheel alignment equipment manufacturer's instructions.

Measure/Adjust:

Important Prior to making any adjustments to wheel alignment on a vehicle, technicians must verify that the wheel alignment specifications loaded into their wheel alignment machine are up-to-date by comparing these to the wheel alignment specifications for the appropriate model and model year in SI. Using incorrect and/or outdated specifications may result in unnecessary adjustments, irregular and/or premature tire wear and repeat customer concerns

Important When performing adjustments to vehicles requiring a 4-wheel alignment, set the rear wheel alignment angles first in order to obtain proper front wheel alignment angles.

Perform the following steps in order to measure the front and rear alignment angles:

1. Install the alignment equipment according to the manufacturer's instructions. 2. Jounce the front and the rear bumpers 3 times prior to checking the wheel alignment. 3. Measure the alignment angles and record the readings.

If necessary, adjust the wheel alignment to vehicle specification and record the before and after measurements. Refer to Wheel Alignment Specifications in SI.

Important Technicians must refer to SI for the correct wheel alignment specifications. SI is the only source of GM wheel alignment specifications that is kept up-to-date throughout the year.

Test drive vehicle to ensure proper repair.

Wheel Alignment Repair Order Questionnaire

Note
Please fill in the blanks. Additional help can be found in the "Vehicle Lead/Pull Diagnostics" located in SI under Suspension - General Diagnosis.

Servicing Dealer:

Phone Number:

VIN_____

Technician Name:

Date:

Model:

Year:

Odometer:

_____

TAC Case # if applicable:

Vehicle Concern Information

Customer Concern:

Tire Wear____ Steering Wheel Off-Angle___
Lead/Pull____ Other _____

Was the customer concern duplicated? Yes___ No___
Is the tire pressure within +/- 3 psi of the tire placard? Yes___ No___
If No, record the tire pressures (psi):
LF____ RF____ LR____ RR____

Tire Wear (If Applicable)
Please check all boxes that apply:
Left Front Tire:
Even Wear___ Inside Shoulder___
Center___ Outside Shoulder___ Cupping/Feathering___

Right Front Tire:
Even Wear___ Inside Shoulder___
Center___ Outside Shoulder___ Cupping/Feathering___

Left Rear Tire:
Even Wear___ Inside Shoulder___
Center___ Outside Shoulder___ Cupping/Feathering___

Right Rear Tire:
Even Wear___ Inside Shoulder___
Center___ Outside Shoulder___ Cupping/Feathering___

Steering Wheel Off-Angle (If Applicable)
Which way was the steering wheel off angle?

Lead/Pull (If Applicable)

Which way does the vehicle lead or pull? Right___ Left___

Were the front tires swapped side to side? Yes___ No___

Was the vehicle checked for brake drag? Yes___ No___

Was the steering gear checked for unbalance?

	Left Front		Right Front		Left Rear		Right Rear	
	Before	After	Before	After	Before	After	Before	After
Toe:								
Camber:								
Caster:					XXXXX	XXXXX	XXXXX	XXXXX
Z/D-Height								

Frame Angle Measurement (Express / Savana Only) .....

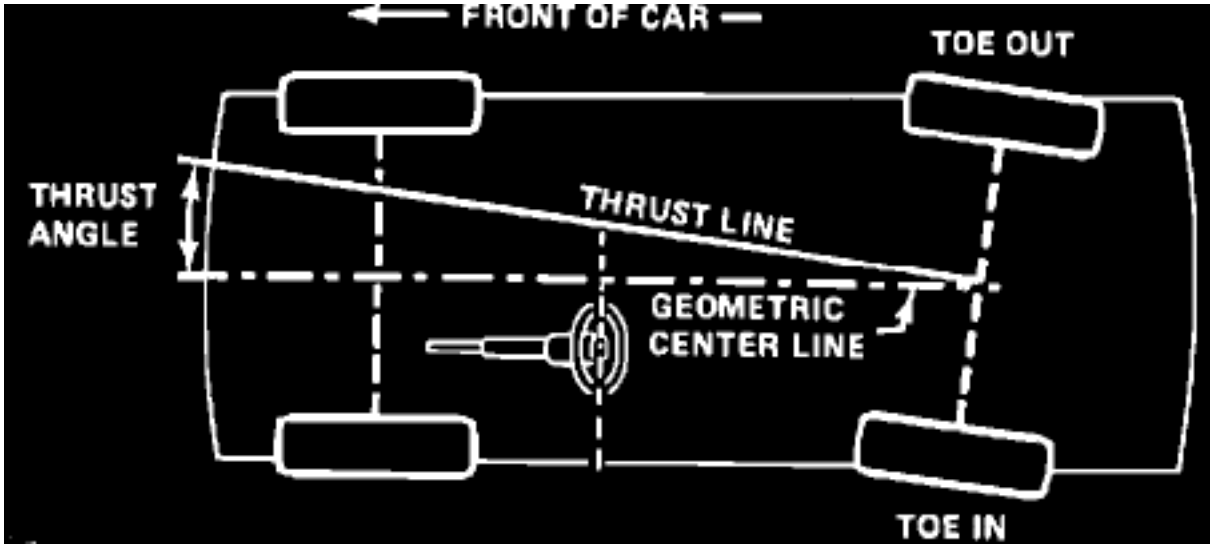
GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

What corrected the customer concern and was the repair verified?

Please Explain: .....

Disclaimer



Alignment: All Technical Service Bulletins Alignment - The Importance of Four Wheel Alignment

Number: 89-01-3A

Section: 3A

Date: SEPT., 1988

Subject: THE IMPORTANCE OF FOUR WHEEL ALIGNMENT

Model and Year: 1979-89 ALL CHEVROLET MODELS

TO: ALL CHEVROLET DEALERS

In which direction will the vehicle pictured below travel if the steering wheel is straight ahead? The vehicle will track to the left because of the directional forces created by the rear wheels and tires. This directional force is called the "thrust angle". The front wheels aim or steer the vehicle but the rear wheels control tracking and assist in directing the car.

What might the driver comment about?

In the illustration, the driver may comment about the steering wheel being off center when going straight down the road. This would be true because of the added input required at the steering wheel to offset the thrust angle force caused by the rear wheels not tracking the front wheels to the geometric center line of the vehicle. The driver may also comment about unusual tire wear, not precise handling characteristics and even decreased fuel economy.

A four wheel alignment allows the technician to measure the toe of each rear wheel to determine if the rear wheels are tracking the geometric center line of the car. Ideally the geometric center line will be the same as the thrust line. In the example in Figure 1, the thrust line has shifted to the right because the rear wheel toe is not tracking the front wheels. This can occur on both or on one rear wheel.

On some vehicles the rear toe is adjustable; other models may require component straightening or replacement or shims. Once the rear toe is properly adjusted or set, the front wheel toe can be set so all four wheels are tracking the geometric center line of the vehicle. This will provide optimum

tire wear, handling and fuel economy characteristics for the vehicle.

Alignment: All Technical Service Bulletins Wheels - Locking Wheel Nuts Impact On Tire Balance

85-37 3E (X) FEB., 1985 Subject:

LOCKING WHEEL NUTS

Model and Year: ALL

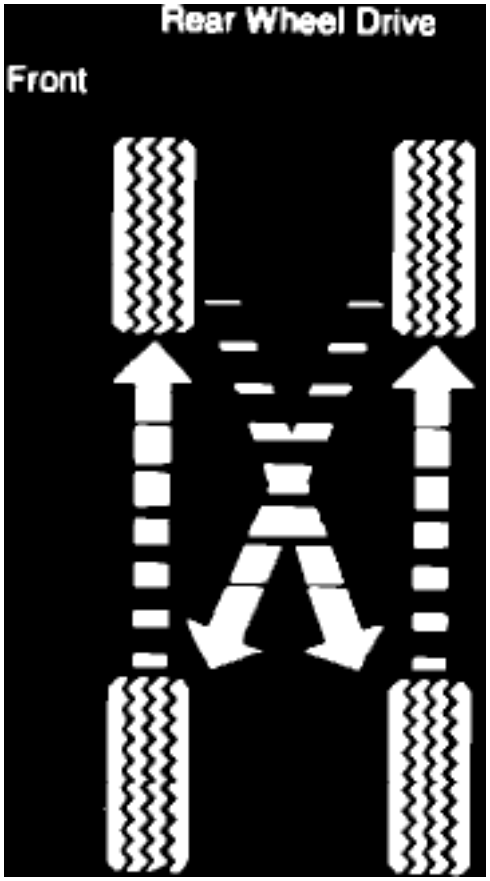
TO: ALL CHEVROLET DEALERS

Whenever a heavier, solid locking wheel nut is used to replace a standard nut, it should be installed nearest the valve stem, and a 1/2 ounce balance weight should be added 180~ opposite the locking nut.

This situation will usually occur on styled wheels. For improved appearance, the balance weight should be installed on the wheel's inboard side.

When rotating tires, always re-install the locking nut nearest the tire valve stem so that it remains opposite the 1/2 ounce balance weight.

This procedure will improve the on-car wheel balance by compensating for the heavy locking wheel nut. This does not apply to the light weight, two-piece locking nuts used on some Chevrolet models.



Alignment: By Symptom

Technical Service Bulletin # 8613 Date: 851201

Tires, Front - Premature Wear on RWD Vehicles

86-13 3 DEC., 1985

Subject: FRONT POSITION TIRE WEAR ON REAR WHEEL DRIVE VEHICLES, AND ALL WEATHER TIRES

Model and Year: ALL REAR WHEEL DRIVE VEHICLES PASSENGER CARS AND LIGHT DUTY TRUCKS TO:

ALL CHEVROLET DEALERS

Some rear wheel drive vehicles may exhibit premature tire wear on the front wheel positions. The wear usually starts on the outer tread row and may progress across the full tread. This wear also usually appears as a heel and toe (high and low) wear pattern on individual tread blocks which can eventually lead to tire noise and/or tire roughness.

Rear Wheel Drive

Small amounts of heel/toe wear on the outer tread is considered normal. This wear is characteristic of new tires at full tread depth on free-rolling axles. Turning and cornering exaggerates front tire wear. Routine tire rotation at 7,500 miles using the modified 'X' method* as shown in the Owners

Manual will minimize the wear. Such tires can be expected to give optimum performance for their full intended life.

If this type of wear becomes excessive and/or results in a customer inquiry, the following procedure should be followed:

1) Rotate tires using the modified 'X' pattern* shown. This allows the front tires to rotate in the opposite direction on the rear of the vehicle which will tend to even out any irregular wear quicker. It also allows all four tires to eventually run on all four positions. Tire noise may continue after rotation, but should gradually lessen after a few thousand miles.

2) Measure front alignment. The single most contributing cause of premature tire wear, except for abusive driving, is excessive toe. For best tire wear, reset toe as close to zero as the specification allows. In most cases, this will be .1~ total toe or less. Camber and caster should also be set to specification if necessary.

3) Talk to the customer about his/her tires. Explain that some amount of shoulder wear on front tires is normal and will even out with regular tire rotation. Explain that front tire shoulder wear is also exagger-

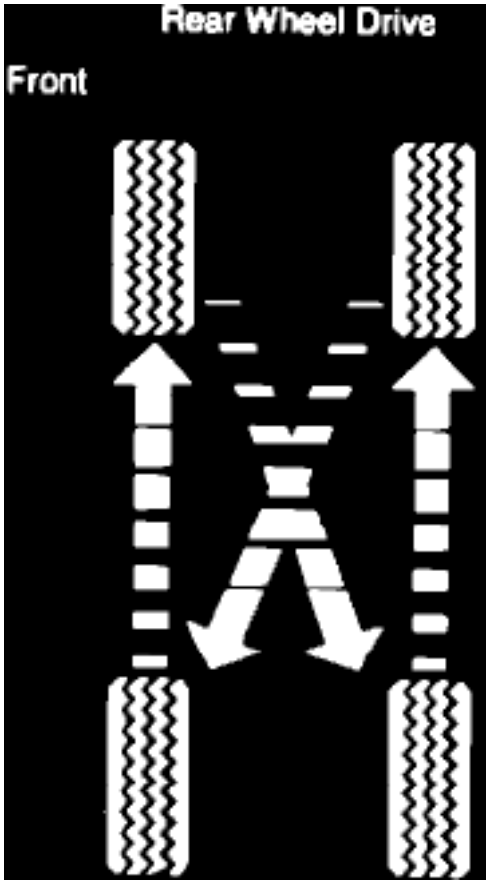
ated by hard cornering. Stress the importance of proper inflation pressure and alignment.

4. If the wear has advanced far enough, tire replacement may become necessary. When installing new tires, match the tire's high point mark to the wheel's valve and then balance. Also, alignment must be reset as specified in Step 2 above and the customer instructed to follow the modified 'X' rotation schedule at 7,500 miles.

*The modified 'X' rotation pattern does not apply to some models, such as Corvettes, Camaros, and Firebirds equipped with directional tires and/or special wheels.

Technical Service Bulletin # 8613 Date: 851201

Tires, Front - Premature Wear on RWD Vehicles



86-13 3 DEC., 1985

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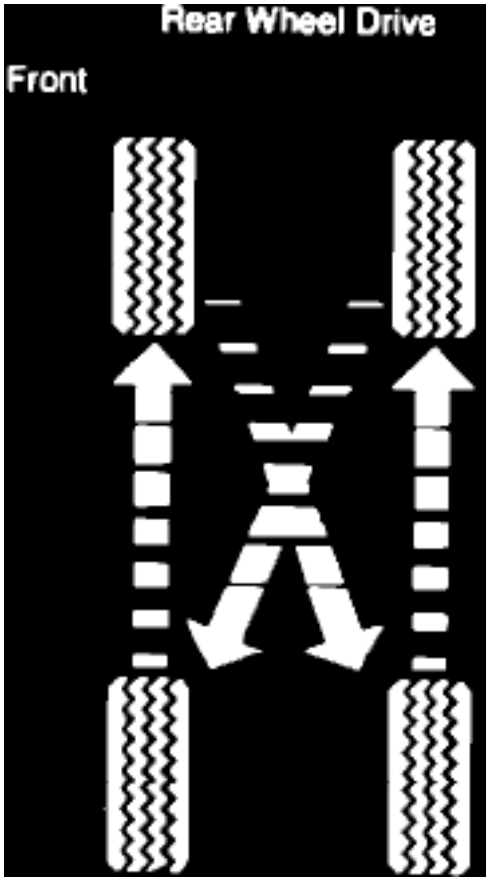

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CASTER, CAMBER, WHEEL, TOE-IN CHART*

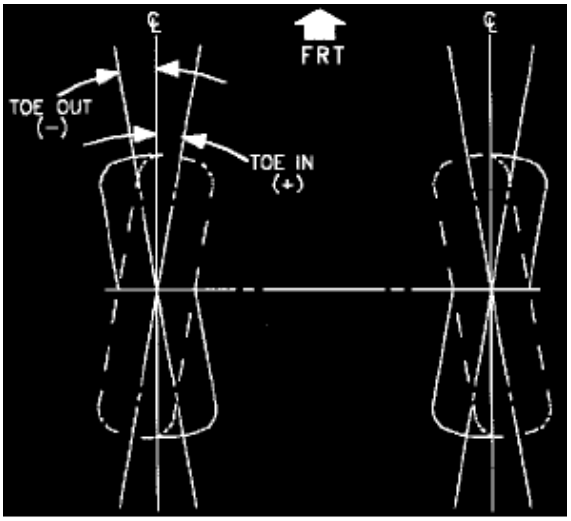
DIMENSION "BC"	G100+200(00) CASTER #	G100+200(00) CAMBER #	G100+200(00) TOTAL TOE-IN #	G300(00) CASTER #	G300(00) CAMBER #	G300(00) TOTAL TOE-IN #
1.50	3.417°	0.50° NOMINAL	.18" NOMINAL OR .36° NOMINAL	3.094°	0.25° NOMINAL	.18" NOMINAL OR .36° NOMINAL
1.62	3.317°			3.034°		
1.75	3.317°			2.967°		
1.88	3.10°			2.800°		
2.00	3.00°			2.667°		
2.12	2.95°			2.500°		
2.25	2.85°			2.367°		
2.38	2.75°			2.233°		
2.50	2.667°			2.100°		
2.62	2.567°			1.967°		
2.75	2.48°			1.833°		
2.88	2.40°			1.633°		
3.00	2.33°			1.500°		
3.12	2.317°			1.367°		
3.25	2.15°			1.233°		
3.38	2.066°			1.117°		
3.50	2.00°			0.967°		
3.62	1.88°			0.833°		
3.75	1.80°			0.700°		
3.88	1.73°			0.583°		
4.00	1.667°			0.450°		
4.12	1.60°			0.333°		
4.25	1.53°			0.200°		
4.38	1.467°			0.100°		
4.50	1.40°			-0.033°		
4.62						
4.75						
4.88						
5.00						
5.12						
5.25						
5.38						
5.50						
5.62						

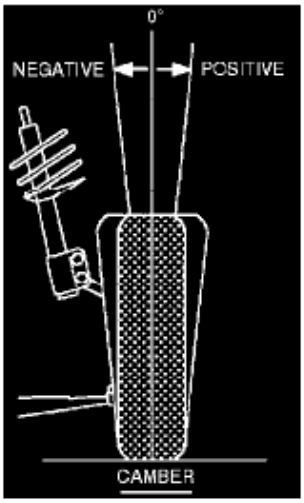
CASTER, CAMBER, WHEEL TOE-IN ALIGNMENT SETTING TOLERANCES ⊕

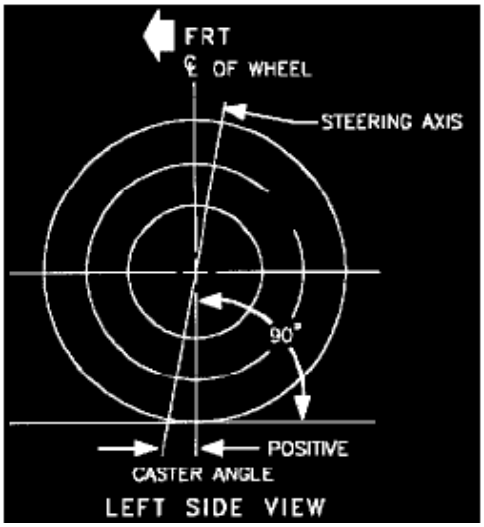
	FACTORY	
	TARGET (Ref)	AUDIT (Eng Spec)
CASTER #	±0.50° ★	±1.00° ◆
CAMBER #	±0.50° ★	±0.75° ◆
TOTAL TOE-IN #	±.06 IN. ±.116°	±.12 IN. ±.232°
	FIELD SERVICE (Ref)	
	CHECK	RE-SET
CASTER #	±1.00° ◆	±0.50° ★
CAMBER #	±0.75° ◆	±0.50° ★
TOTAL TOE-IN #	±.12 IN. ±.232°	±.06 IN. ±.116°

* Use in conjunction with Tolerances Chart above.
# See appropriate Alignment Sheet
⊕ Use with Caster, Camber, Wheel Toe-in Chart at left.
★ Left & Right to be Equal within 0.50°.
◆ Left & Right to be Equal within 1.00°.

Alignment Specs. "G" Van


℄
FRT
℄
TOE OUT
(–)
TOE IN
(+)


0°
NEGATIVE
POSITIVE
CAMBER

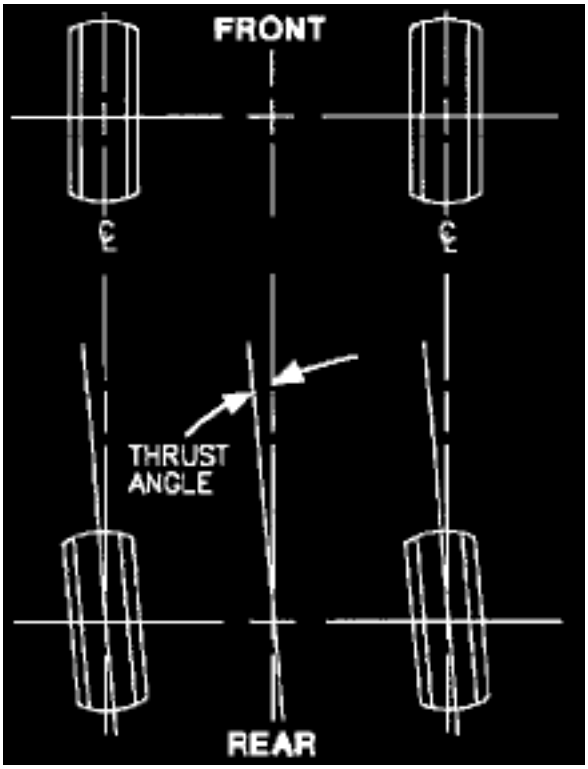

FRT
℄ OF WHEEL
STEERING AXIS
90°
POSITIVE
CASTER ANGLE
LEFT SIDE VIEW

Alignment: Description and Operation

Toe In/Out Description

Camber Description

Caster Description



Thrust Angle Description

WHEEL ALIGNMENT DEFINITIONS

Wheel alignment refers to the angular relationship between a vehicles wheels, suspension attaching points, and the ground. Vehicles with properly aligned front and rear suspensions handle predictably, and provide good straight line stability on the highway with minimal tire wear. In real world driving conditions, wheel alignment settings change over time due to suspension component wear or damage; they must be periodically checked and adjusted as necessary.

TOE IN/OUT

Toe is a measure of how far a wheel is turned in or out from the straight ahead direction. When the front of a wheel is turned in, the toe is positive. When turned out, the toe is negative.

CAMBER

Camber is a measure of wheel tilt from the vertical direction, when the wheel is viewed from the front or rear of the vehicle. Camber is negative when the top of the wheel tilts inward and positive when the top of the wheel tilts outward.

CASTER

Caster is a measure of the angle between the steering axis and vertical when viewed from the side of the vehicle with the wheel in the straight ahead position. The steering axis is determined by the location of the lower control arm ball joint and the center of the strut-to-body attachment. A line drawn through the center of the ball joint and the strut-to-body joint represents the steering axis. When the center point of the strut-to-body attachment is rearward of the ball joint, the caster is positive. When the center of the strut-to-body attachment is forward of the ball joint, the caster is negative.

THRUST ANGLE

Thrust angle is the angle between the geometric centerline of the vehicle and the direction that the rear wheels track. Ideally, the thrust angle is equal to zero.

Alignment: Service and Repair Preliminary Inspection

INSPECTION

Steering and vibration problems are not always the result of alignment. An additional problem to be checked is tire lead due to worn or improperly manufactured tires. "Lead" is the deviation of the vehicle from a straight path on a level road without hand pressure on the steering wheel.

To insure correct alignment readings and alignment specifications, the following checks and inspections should be made:

1. Check tire for proper inflation and thread wear. 2. Check front wheel bearings for looseness (0.001 - 0.008 inch end play is correct) and adjust if necessary. 3. Check for loose ball joints and tie rod ends. If excessive looseness is noted, replace defective parts before adjusting toe. 4. Check for wheel and tire assembly runout. 5. Check trim heights.

If not within specifications, correct before adjusting toe.

6. Check for loose control arms and steering gear at frame. 7. Check for loose or missing stabilizer bar components. 8. Consideration must be given to excess loads, such as tool boxes, etc. If excess load is normally carried in vehicle, it should remain during

alignment checks.

Alignment: Service and Repair Front Wheel Alignment

G10-20 Models With 3/4" Nut

PROCEDURE

Jack up the frame to raise the wheel off the ground. This will allow the upper control arm to drop down far enough to use a socket on the nuts and permit shim adjustment.

A normal shim pack will leave at least two (2) threads of the bolt exposed beyond the nut. If two (2) threads cannot be obtained, check for damaged control arms and related parts. The difference between front and rear shim packs must not exceed 7.62mm (0.30 inches). Front shim pack must be at least 2.54mm (0.10 inches).

G30 Models With 7/8" Nut

PROCEDURE

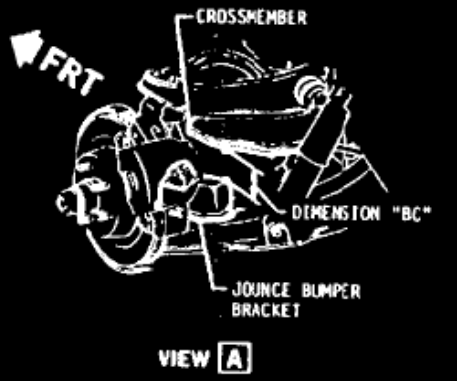
Remove the upper control arm bumper. Jack up the frame to raise the wheel off the ground. This will allow the upper control arm to drop down far enough to use a socket on the nuts and permit shim adjustment. Reinstall the upper control arm bumper when alignment is completed.

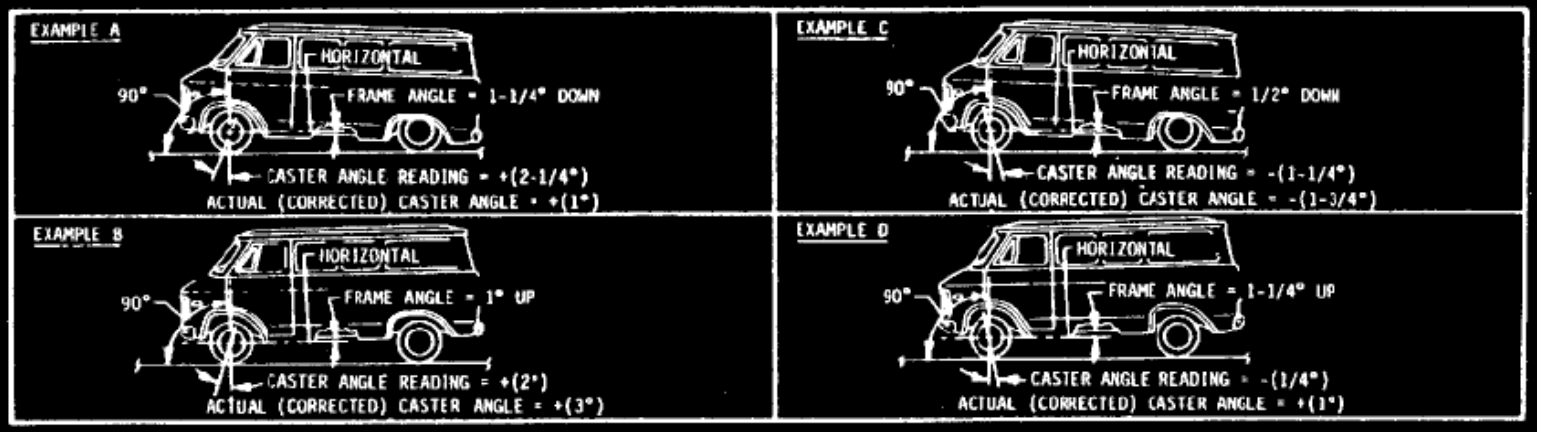
A normal shim pack will leave at least two (2) threads of the bolt exposed beyond the nut. If two (2) threads cannot be obtained, check for damaged control arms and related parts. The difference between front and rear shim packs must not exceed 7.62mm (0.30 inches). Front shim pack must be at least 2.54mm (0.10 inches).

Front Caster Adjustment

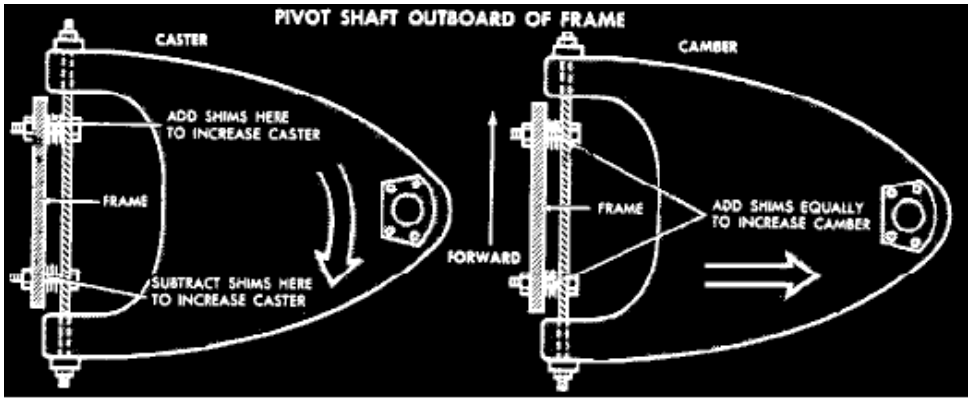
HOW TO DETERMINE CASTER ANGLE

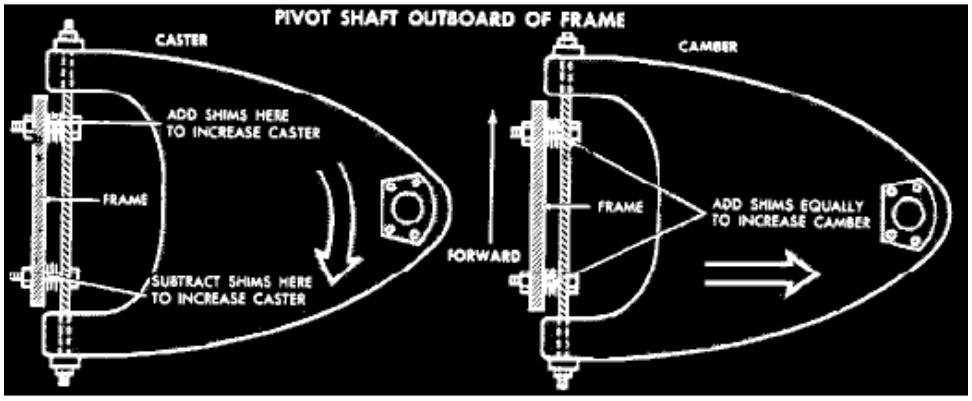
1. With the vehicle on a level surface, determine the Frame Angle using a bubble protractor or clinometer.
2. Determine the Caster Angle Reading from the alignment equipment.
3. To determine an ACTUAL (CORRECTED) CASTER ANGLE with various Frame Angles and Caster Angle Readings from the alignment equipment, one of the following rules apply:
   - A. A "down in rear" Frame Angle must be subtracted from a positive Caster Angle Reading. See Example A.
   - B. An "up in rear" Frame Angle must be added to a positive Caster Angle Reading. See Example B.
   - C. A "down in rear" Frame Angle must be added to a negative Caster Angle Reading. See Example C.
   - D. An "up in rear" Frame Angle must be subtracted from a negative Caster Angle Reading. See Example D.
4. Dimension "BC" measured 90° from lower surface of Crossmember & to inboard rear corner of Jounce Bumper Bracket. See View A.
5. Using Dimension "BC" and the CASTER, CAMBER, WHEEL TOE-IN CHART SHEET, find the Recommended Caster Angle.
6. If an ACTUAL (CORRECTED) CASTER ANGLE (Step 3) does not correspond to a Recommended Caster Angle (Step 5) within ±1°, make necessary shim changes to bring the ACTUAL (CORRECTED) CASTER ANGLE in line with the Recommended Caster Angle.

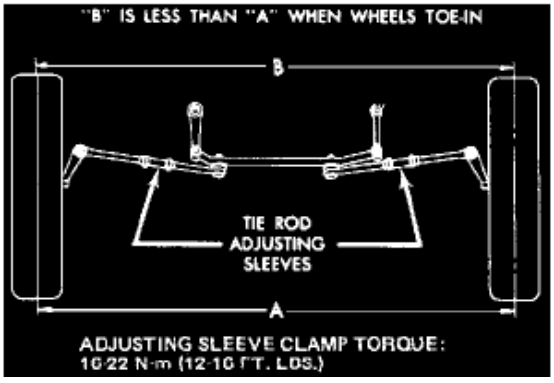




(Figure 1) Caster Angle


PIVOT SHAFT OUTBOARD OF FRAME
CASTER
CAMBER
ADD SHIMS HERE TO INCREASE CASTER
FRAME
SUBTRACT SHIMS HERE TO INCREASE CASTER
FORWARD
FRAME
ADD SHIMS EQUALLY TO INCREASE CAMBER


PIVOT SHAFT OUTBOARD OF FRAME
CASTER
CAMBER
ADD SHIMS HERE TO INCREASE CASTER
FRAME
SUBTRACT SHIMS HERE TO INCREASE CASTER
FORWARD
FRAME
ADD SHIMS EQUALLY TO INCREASE CAMBER


"B" IS LESS THAN "A" WHEN WHEELS TOE-IN
B
TIE ROD ADJUSTING SLEEVES
A
ADJUSTING SLEEVE CLAMP TORQUE:
16-22 N·m (12-16 FT. LBS.)

Caster/Camber Adjustment

PROCEDURE

All caster specifications are given with a frame angle of zero. Therefore, it will be necessary to know the angle of the frame (whether "up" in rear or "down" in rear) before a corrected caster reading can be determined (Figure 1).

Front Camber Adjustment

Caster/Camber Adjustment

PROCEDURE

1. Determine camber angle using suitable equipment. 2. Add or subtract shims from both front and rear bolts to adjust camber as required.

Front Toe Adjustment

Toe-In Adjustment

PROCEDURE

1. Determine toe-in from the alignment equipment. 2. Change length of both tie rod sleeves to effect a toe change. 3. Toe-in can be increased or decreased by changing the length of the tie rod ends. A threaded sleeve is provided for this purpose.

When the tie rod ends are mounted ahead of the steering knuckle they must be decreased in length in order to increase toe-in. When the tie rod ends are mounted behind the steering knuckle they must be lengthened in order to increase toe-in.

Fuel Pressure: Specifications

Fuel Pressure .... 27.5 to 44.8 kPa (4 to 6.5 psi) Fuel Pump Vacuum .... 50.6 kPa (15 inches Hg)

Fuel Pressure: Testing and Inspection Fuel Pump Flow Test - Fuel Injected

FUEL PUMP FLOW TEST

1. Disconnect the EFI fuel feed line, then connect suitable hose to line and direct end into suitable container.

2. Apply battery voltage to the fuel pump test terminal. The fuel pump should supply 1/2 pint or more fuel within 15 seconds.

3. If fuel flow is below minimum, check for fuel restrictions. If there is no restrictions, check pump vacuum and/or pressure.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Fuel Injected

FUEL PRESSURE TEST

- Turn engine "OFF" and perform Fuel Pressure Relief procedure.

CAUTION: A small amount of fuel may be released, after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Place the cloth in an approved container when disconnect is completed.

- Install fuel pressure gage J-29658A/BT8205, or equivalent, at the outlet side of the in-line fuel filter.

- Start engine and observe fuel pressure reading. It should be 62-90 kPa (9-13 psi).

- Relieve fuel pressure.

- Remove fuel pressure gage.

- Re-install fuel hose or pipe assembly to in-line fuel filter.

- Start engine and check for fuel leaks.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB # 90-6C-89, Dated 9/90

Some 1985-90 engines equipped with 2.5L, 2.8L, 4.3L, 5.0L, 5.7L or 7.4L may experience a condition where fuel delivery is interrupted to the engine causing a "no start condition". This condition may be caused by deterioration of the in-tank fuel pump coupler hose located between the fuel pump sending unit and the fuel pump. This condition may be repaired by replacing the original coupler hose with a new VITON coupler hose kit P/N 25028041. The kit consist of a new VITON hose and two clamps.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Mechanical Fuel Pump

FUEL PUMP PRESSURE TEST

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be (4 to 6.5 psi). 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pressure: Testing and Inspection Fuel Pump Vacuum Test - Mechanical Fuel Pump

FUEL PUMP VACUUM TEST

1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least (15" Hg.). If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.

Fuel Pressure: Testing and Inspection Fuel System Pressure Test - Carbureted

Fuel Pump Flow Test:

1. Connect hose from carburetor fuel feed line to a suitable unbreakable container and crank engine. 2. Fuel pump should supply 1/2 pint or more in 15 seconds. 3. If flow is below minimum, check for fuel restriction. If there is no restriction, check pump pressure and/or vacuum.

Fuel Pump Pressure Test:

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be 4 to 6.5 psi. 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pump Vacuum Test:

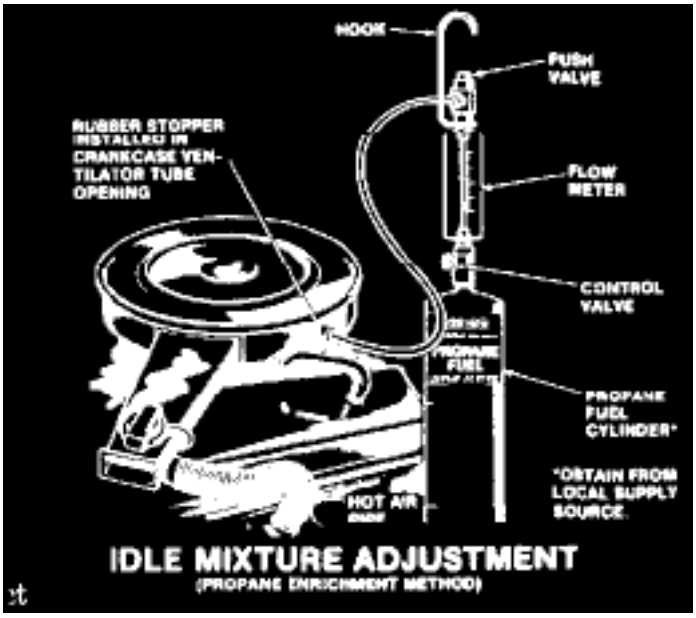
1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least 15" Hg. If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.



Air/Fuel Mixture: Adjustments Federal

Light Duty

NOTE: Vehicles with a Gross Vehicle Weight Rating (GVWR) below 6000 lbs (8500 lbs for California), and passenger carrying vehicles with a capacity of 12 persons or less, are Light Duty Emissions Vehicles.

NOTE: Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement or high emissions as determined by official inspections. Adjusting mixture by other than the following method may violate Federal and or California or other state or Provincial laws. Because of the sealed idle mixture needles, the idle mixture checking procedure requires artificial enrichment by adding propane.

1. Set parking brake and block drive wheel. Engine must be at normal operating temperature and air conditioning off. 2. Disconnect and plug EGR and cannister purge vacuum hoses. 3. Connect an accurate tachometer to engine. 4. Disconnect vacuum advance and set timing to specification. Reconnect vacuum hose. See: Ignition Timing 5. Set carburetor idle speed to specification. See: Powertrain Management/Fuel Delivery and Air Induction/Adjustments 6. Disconnect crankcase ventilation tube from air cleaner.

Fig. 61 - Propane Enrichment Tool Installation

7. Using tool J-26911, insert hose with rubber stopper, from propane valve into crankcase ventilation tube opening in air cleaner. Propane cartridge

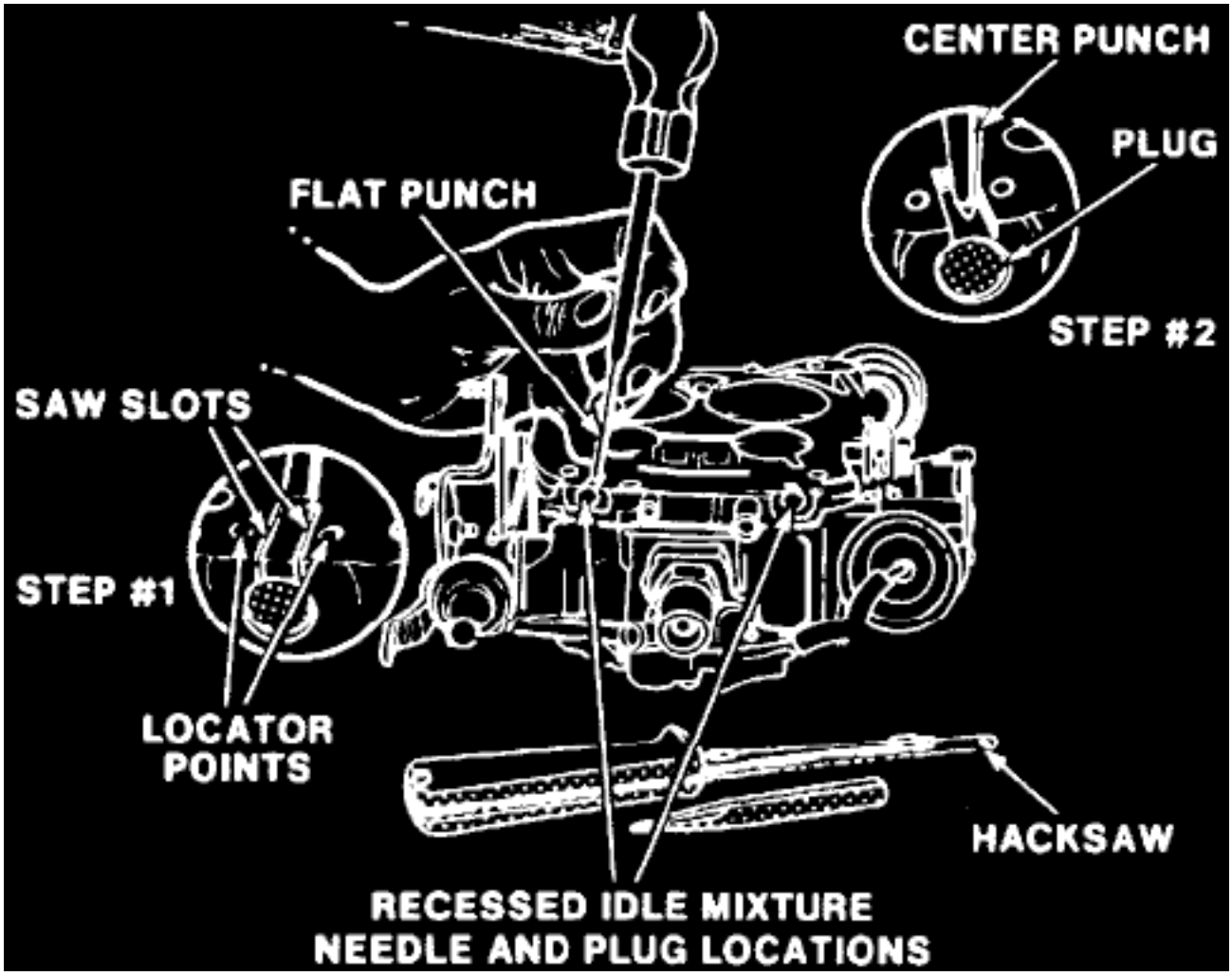
must be vertical.

8. With engine idling in drive (neutral for manual shifts) slowly open propane control valve while pressing button. Continue to add propane until

speed drops due to over richness. Note maximum engine speed (enriched speed).

9. If the enriched idle speed is within the enriched idle specification the mixture is correct. Go to step 17.

Enrichment Specification: See: Idle Speed/Specifications



10. If the enriched idle speed is not within specification, remove mixture screw plugs as follows:

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.

11. Using tool J29030 or equivalent, lightly seat mixture needles, then back out equally, just enough so engine will run. 12. Place transmission in drive (automatic) or neutral (manual). 13. Back each screw out (richen 1/8 turn at a time until maximum idle speed is obtained). Then using base idle speed adjustment screw, set idle speed

to the enriched idle specification. See: Idle Speed/Specifications

14. Turn each mixture screw in (clockwise) 1/8 turn at a time until idle speed reaches base idle speed. 15. Re-check enriched speed with propane. If not within specification, repeat adjustment beginning with step 12. 16. After adjustments are complete, seal the idle mixture needle setting using silicone sealant or equivalent. The sealer is required to prevent

tampering with the setting and to prevent the possibility of loss of fuel vapors.

17. Check and adjust fast idle speed. See: Powertrain Management/Fuel Delivery and Air Induction/Adjustments 18. Turn off engine. Remove propane tool, connect crankcase ventilation tube. Unplug and reconnect vacuum hoses. Install air cleaner.

Heavy Duty

NOTES:

- Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement, or high emissions as determined by official inspections.

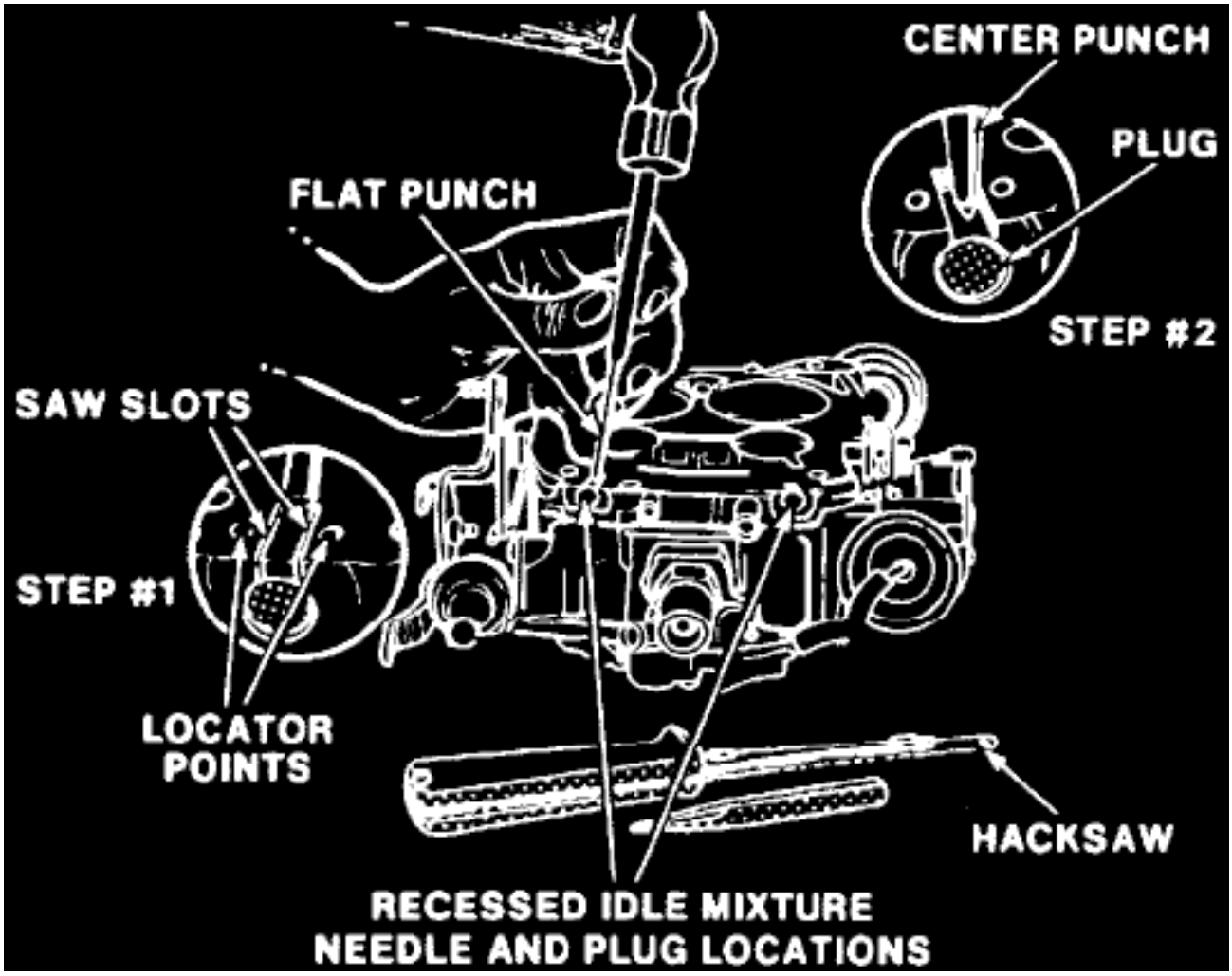
- If necessary, remove idle needle plugs:

- Perform this adjustment with engine at operating temperature, parking brake applied, drive wheels blocked and transmission in park or neutral.

ADJUSTMENT PROCEDURE

1. Remove air cleaner. 2. Connect tachometer and vacuum gage to engine. 3. As a preliminary adjustment, turn idle mixture needles in lightly to seat and back out 2 turns.

NOTE: Do not turn idle mixture needle tightly against seat or damage may result.



4. With engine running (choke wide open and transmission in neutral) adjust idle speed screw to curb idle speed. See: Idle Speed/Adjustments/Idle

Speed

5. Adjust each idle mixture needle to obtain highest RPM. 6. Repeat steps 4 and 5 until "best" idle is obtained. 7. If necessary, reset curb idle speed. See: Idle Speed/Adjustments/Idle Speed/Federal 8. After adjustments are complete, seal the idle mixture needle setting using silicone sealant or equivalent. 9. Check and if necessary, adjust throttle lever actuator.See: Idle Speed/Adjustments/Idle Speed

10. Check and if necessary, adjust fast idle speed. See: Idle Speed/Adjustments/Fast Idle Speed 11. Turn off engine, remove gages, unplug and reconnect vacuum hoses. Install air cleaner. 12. Remove block from drive wheel.

CONCEALMENT PLUG REMOVAL

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

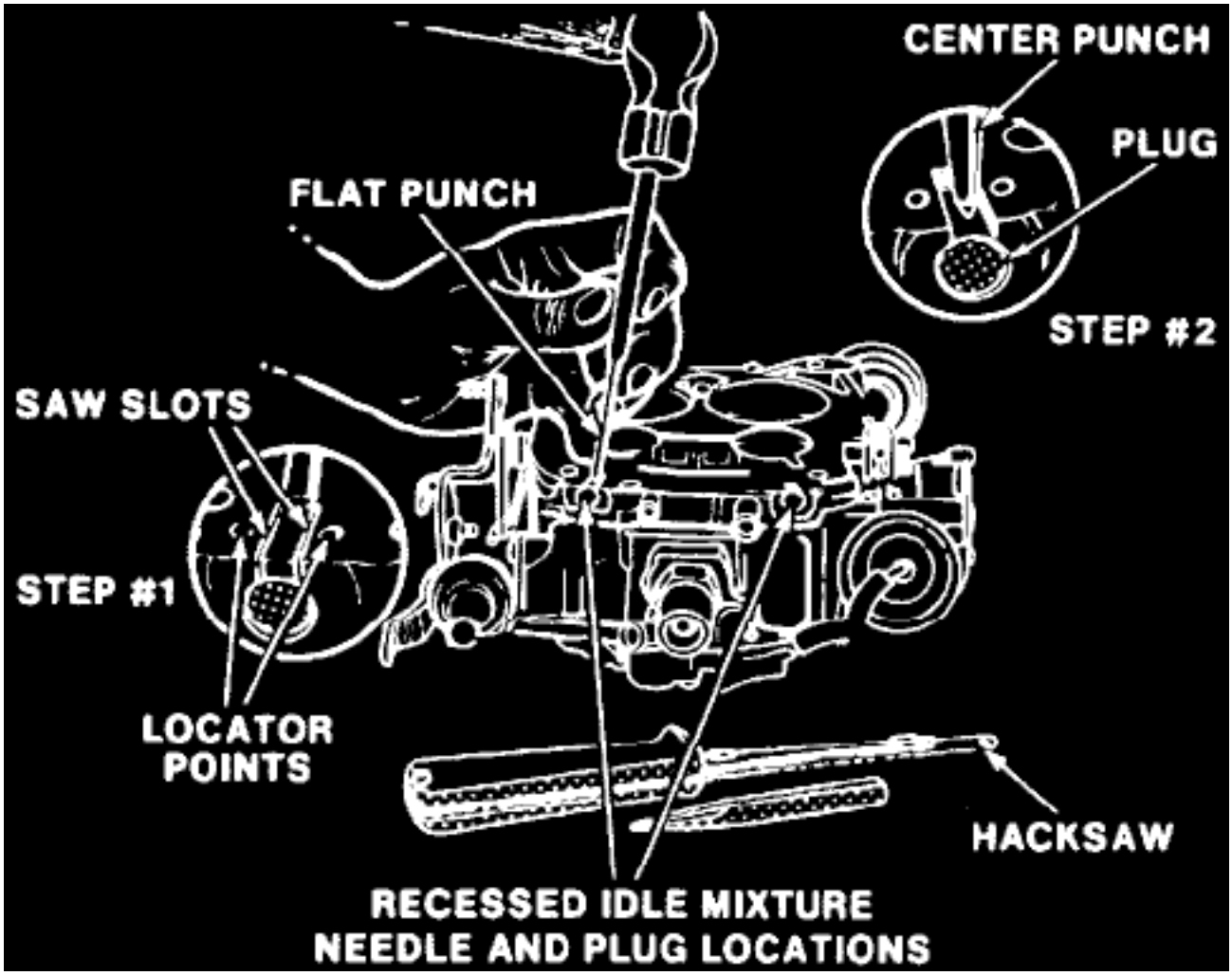
- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.



Air/Fuel Mixture: Adjustments California

IDLE MIXTURE NEEDLES ADJUSTMENT

1. Remove concealment plugs if necessary:

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.

NOTE: Always use a new carburetor base gasket.

2. Using tool J030930, BT-7610-B, or equivalent, remove both idle mixture needles and springs for inspection:

- Needles must not be bent, burred or otherwise damaged.

- Inspect both idle needle openings in the throttle body for any damage or foreign material. Clean as necessary.

3. Install idle mixture needles and springs:

- Turn both mixture needles clockwise until lightly seated.

- Turn each mixture needle counter clockwise 3 turns.

4. Disconnect vacuum hose to canister purge valve and plug it. 5. Place a spacer (0.75 to 0.10 inches) between accelerator pump lever and Throttle Position Sensor (TPS) plunger. 6. Connect dwell meter to Mixture Control (M/C) solenoid dwell lead. This is a green connection breaking out of the main wiring harness leading to

carburetor.

NOTE: Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested

7. Start engine and allow it to reach normal operating temperature. 8. While idling in "DRIVE" (NEUTRAL for manual transmission) adjust both mixture needles equally, in 1/8 turn increments, until dwell reading

varies within the 25-35° range, attempting to be as close to 30° as possible.

NOTE: If reading is too high, turn mixture needles clockwise. If reading is too low, turn mixture needles counterclockwise. Allow time for dwell reading to stabilize after each adjustment.

9. After adjustments are complete, seal the idle mixture needle opening in the throttle body, using silicone sealant or equivalent.

10. Check and adjust idle speed.

Idle Speed: Specifications Enriched Idle Speed

ENRICHED IDLE SPEED

Carburetor Number

17085206 ..... 20 17085208 10
17085209 ..... 50 17085210 10
17085211 50

17085220 ..... 75 17085221 75
17085222 ..... 20 17085223 50
17085224 20

17085225 ..... 50 17085226 20
17085227 ..... 20 17085228 30
17085229 30

17085230 ..... 20 17085231 40
17085235 ..... 80 17085239 75
17085283 75

17085284 ..... 20 17085285 20
17085290 ..... 30 17085291 100
17085292 ..... 30 17085293 100

NOTE: Enriched Idle Speed value is added to base idle speed. This value is used during the idle mixture adjustment procedure.

Idle Speed: Specifications Idle Speed

CURB IDLE SPEED

Light Duty

Manual ..... 700 rpm Automatic ..... 550 rpm (High Altitude 600)

Heavy Duty

Manual ..... 600 rpm Automatic ..... 700 rpm

A/C ON IDLE SPEED

Manual ..... 800 rpm Automatic ..... 650 rpm

FAST IDLE SPEED

Light Duty

Manual ..... 1300 rpm Automatic

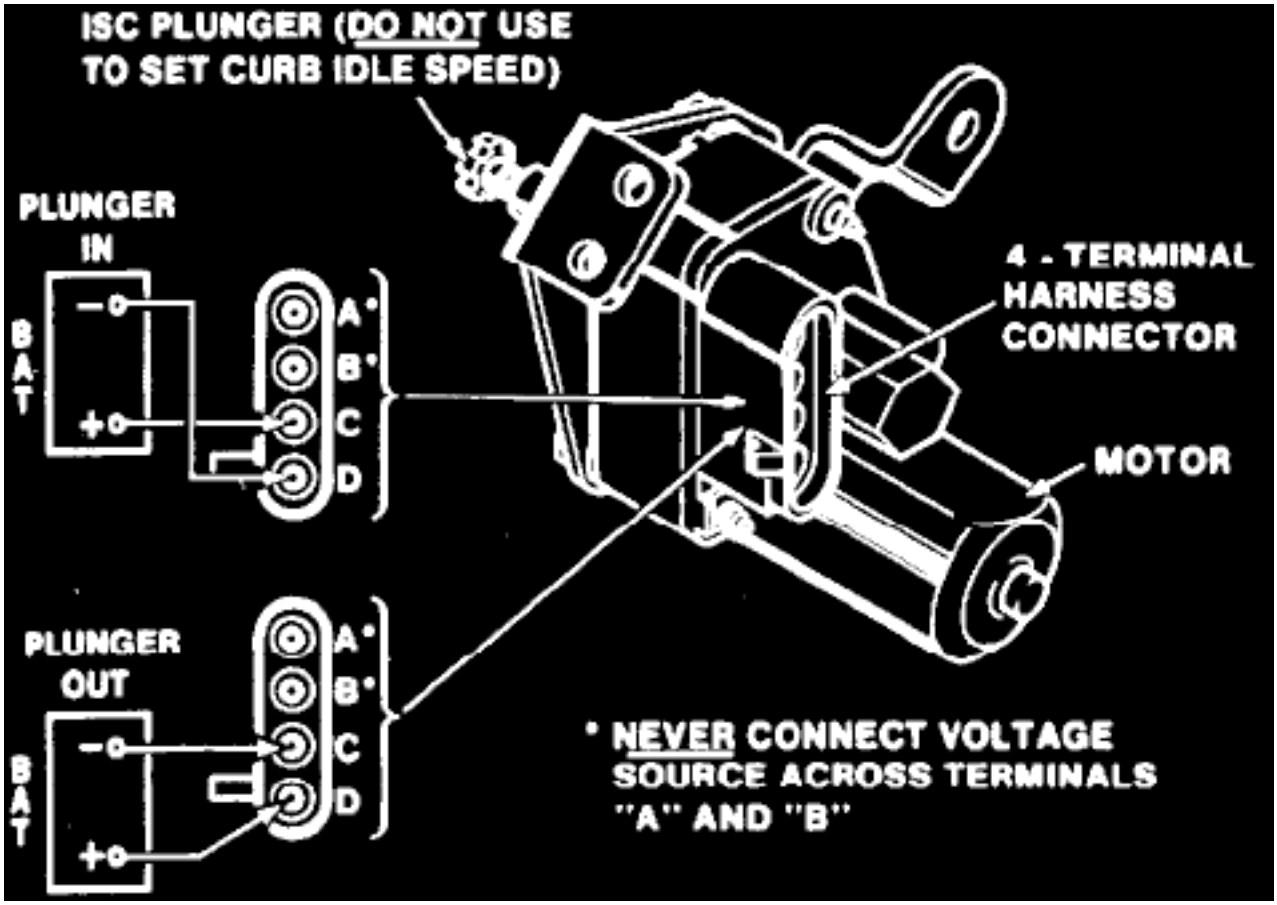
Federal ..... 1600 rpm California ..... 1800 rpm

High Altitude ..... 1400 rpm

Heavy Duty

Automatic/Manual ..... 1900 rpm

NOTE: All fast idle speeds are measured with the fast idle cam on the high step.



Idle Speed: Adjustments Idle Speed

California

NOTE: On engines equipped with an Idle Speed Control (ISC) motor, idle speed is controlled by an electrical signal from the Electronic Control Module (ECM). Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows.

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures:

- Check and adjust ignition timing.

- Disconnect and plug vacuum lines for evaporative purge and EGR valve.

2. Before starting engine, place transmission in "PARK" (automatic) or "NEUTRAL" (manual), set parking brake and block drive wheels. 3. Connect dwell meter to Mixture Control (M/C) solenoid dwell lead. This is a green connection breaking out of the main wiring harness leading to

carburetor.

NOTE: Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF". 5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary). 6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

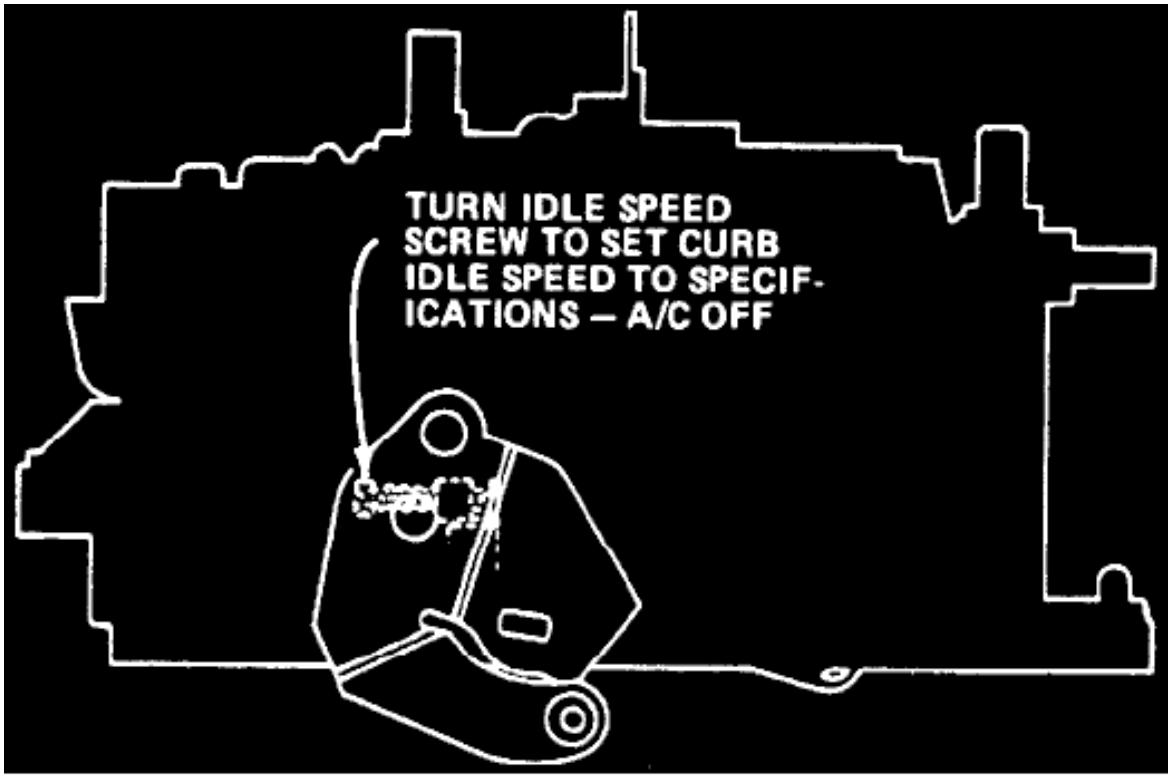
7. Unplug connector from ISC motor.

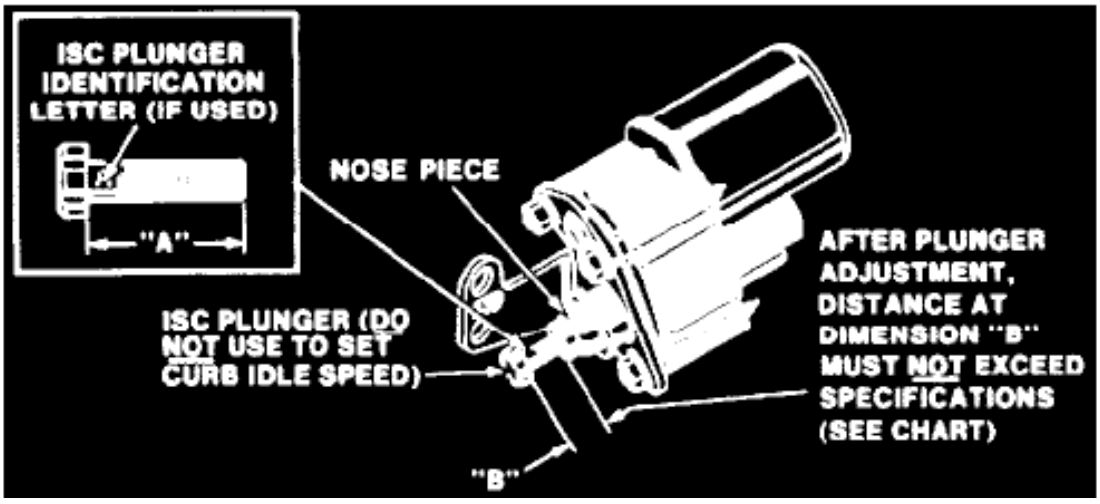
8. Fully retract ISC plunger by applying 12 volts to terminal "C" ad grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place automatic transmission in "DRIVE".


TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIF-ICATIONS – A/C OFF


ISC PLUNGER IDENTIFICATION LETTER (IF USED)
"A"
NOSE PIECE
ISC PLUNGER (DO NOT USE TO SET CURB IDLE SPEED)
"B"
AFTER PLUNGER ADJUSTMENT, DISTANCE AT DIMENSION "B" MUST NOT EXCEED SPECIFICATIONS (SEE CHART)

11. With ISC plunger fully retracted, adjust carburetor base (slow idle stop screw to 470 RPM (minimum authority). 12. Place transmission in "PARK" (automatic transmissions). 13. Fully extend ISC plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC motor connection. Leave power

applied only long enough to extend the plunger.

14. MANUAL TRANSMISSIONS: Using tool J29607 or BT-8022 or equivalent, turn ISC plunger to obtain 900 RPM (Maximum Authority). 15. AUTOMATIC TRANSMISSIONS:

- With transmission in "PARK", using tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

- With parking brake set and drive wheels blocked, place transmission in "DRIVE". Turn ISC plunger to obtain 900 RPM (Maximum Authority).

16. Recheck ISC "Maximum Authority" RPM with voltage applied to ISC motor (step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nosepiece. Dimension "B" must not exceed that shown

in below chart.

IDLE SPEED CONTROL PLUNGER		
IDENTIFICATION LETTER	PLUNGER LENGTH DIMENSION A	AFTER ADJUSTMENT (STEPS 14, 15, or 16), DISTANCE AT DIMENSION "B" MUST NOT EXCEED
NONE	14.1 mm (9/16")	5.6 mm (7/32")
NONE	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/64")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1")	17.1 mm (43/64")
L	27.5 mm (1 3/32")	19.0 mm (3/4")
J	30.0 mm (1 3/16")	21.5 mm (27/32")
N	32.0 mm (1 17/64")	23.5 mm (59/64")
T	34.0 mm (1 11/32")	25.5 mm (1")

18. Fully retract ISC plunger (step 8). Place transmission in "PARK" (automatic) or "NEUTRAL" (manual) and turn ignition "OFF". Disconnect 12

volt power source, ground lead, tachometer and dwell meters. With ignition "OFF" reconnect four terminal harness connector to ISC motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By

restoring the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Federal

PRELIMINARY PROCEDURES

- Warm engine to normal operating temperature (upper radiator hose hot).

- Turn "OFF" all accessories, including A/C.

- Check Timing (adjust if not to specification). See: Ignition Timing

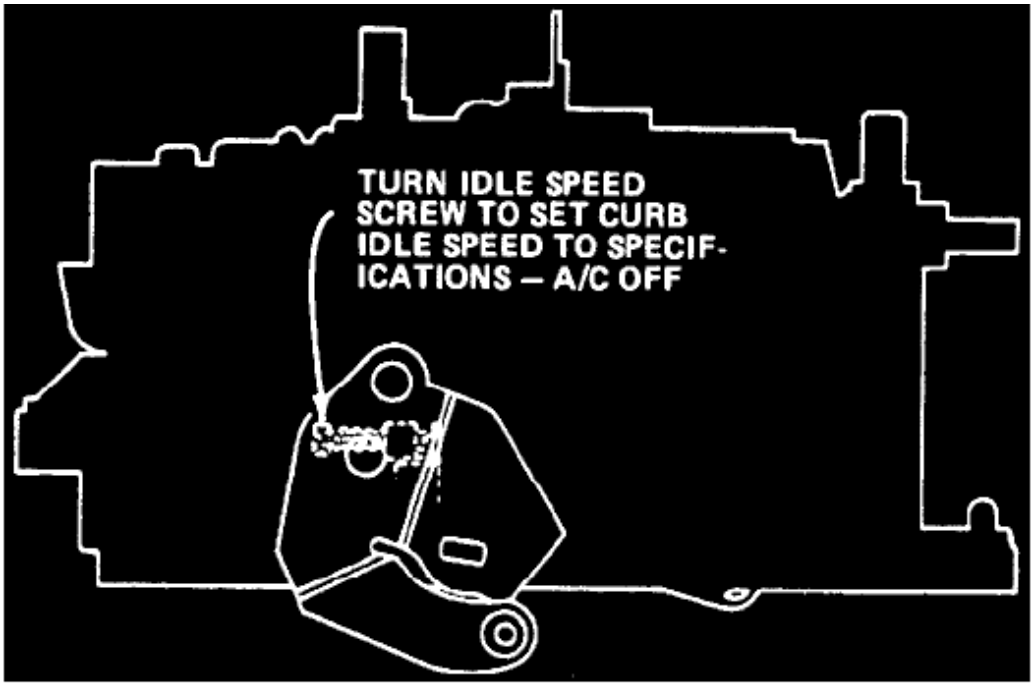
- Connect tachometer.

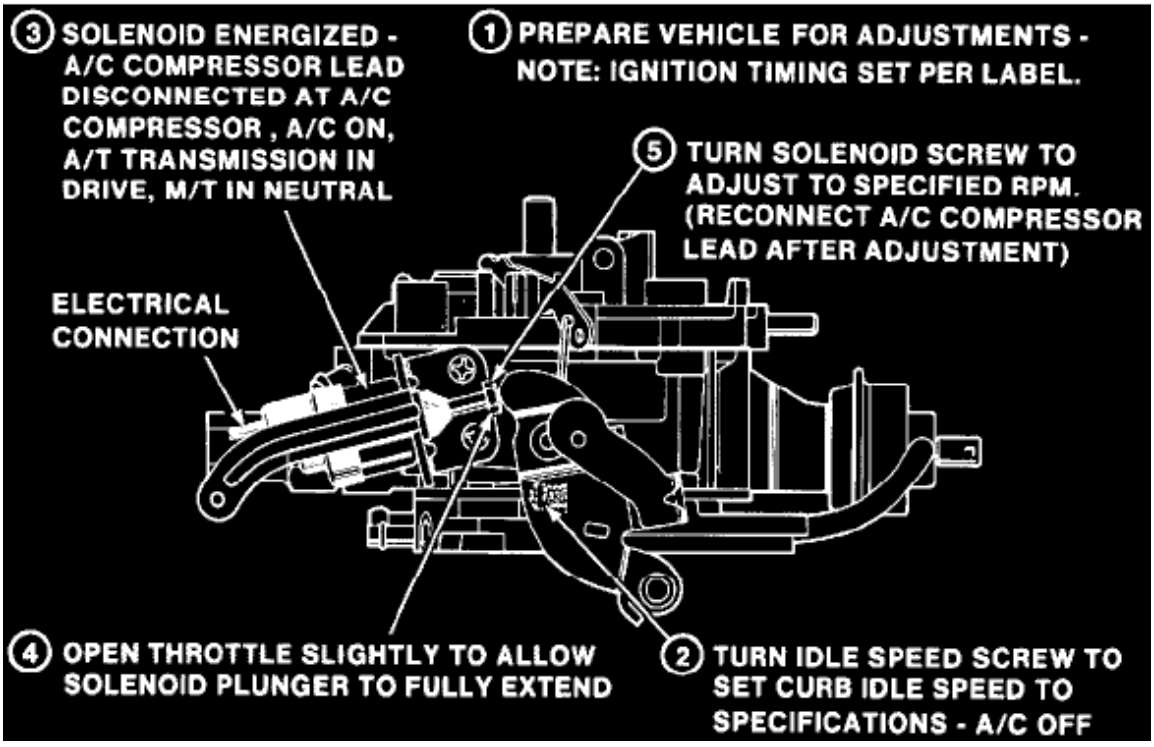
CAUTION: Exercise care not to ground the TACH terminal (which is located next to the BAT connector) as this may damage the Electronic Control Module (ECM) or coil.

CURB IDLE SPEED

- Disconnect and plug vacuum hose to EGR valve and canister purge.

- Adjust curb idle speed.


TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIF-ICATIONS – A/C OFF


3 SOLENOID ENERGIZED - A/C COMPRESSOR LEAD DISCONNECTED AT A/C COMPRESSOR , A/C ON, A/T TRANSMISSION IN DRIVE, M/T IN NEUTRAL
1 PREPARE VEHICLE FOR ADJUSTMENTS - NOTE: IGNITION TIMING SET PER LABEL.
5 TURN SOLENOID SCREW TO ADJUST TO SPECIFIED RPM. (RECONNECT A/C COMPRESSOR LEAD AFTER ADJUSTMENT)
ELECTRICAL CONNECTION
4 OPEN THROTTLE SLIGHTLY TO ALLOW SOLENOID PLUNGER TO FULLY EXTEND
2 TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIFICATIONS - A/C OFF

Without A/C -

Turn idle speed screw to specified curb idle (automatic transmissions in drive with wheels blocked and parking brake set). See: Specifications

With A/C -

With A/C "OFF", turn idle speed screw to specified curb idle (automatic transmissions in drive with wheels blocked and parking brake set).

- Disconnect wire to A/C compressor clutch and turn A/C "ON".

- Open throttle momentarily to assure solenoid plunger is fully extended.

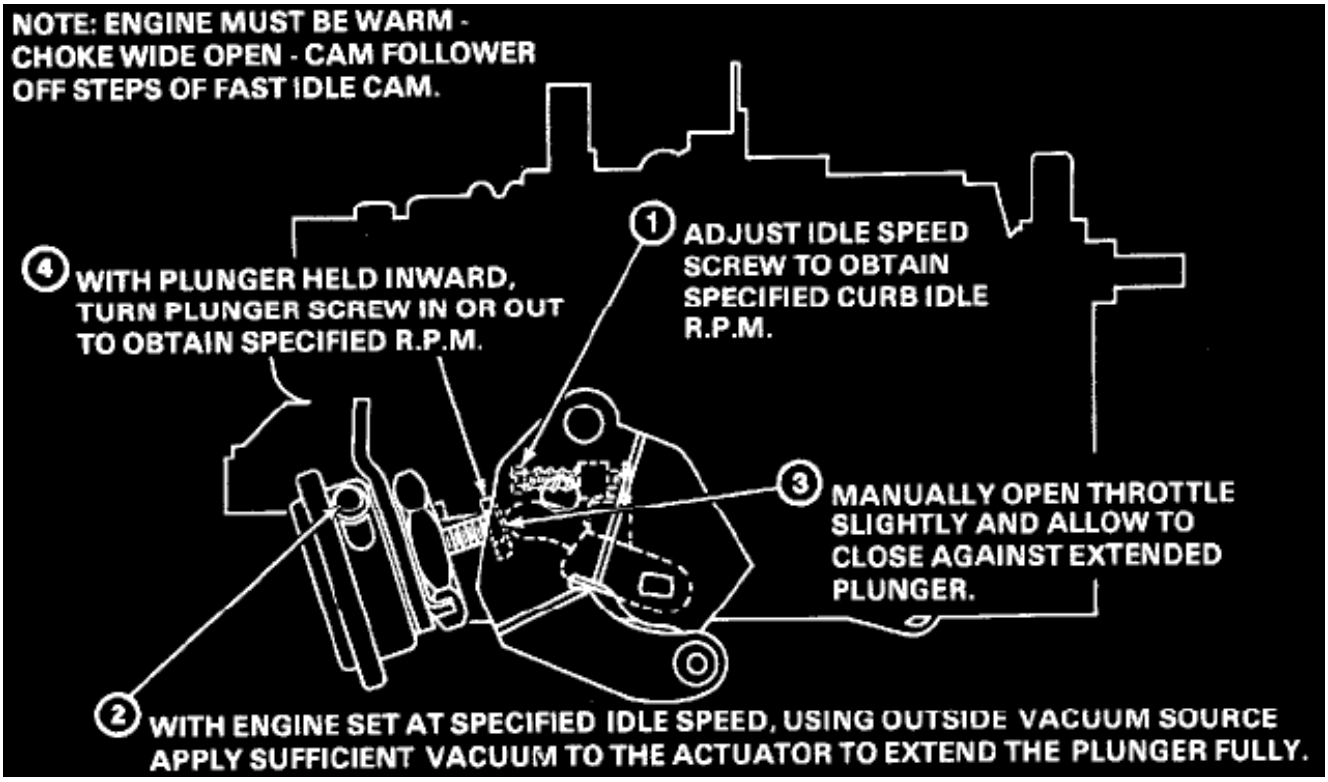
- Turn solenoid screw to the specified idle speed. See: Specifications

- Reconnect wire to compressor clutch.

THROTTLE LEVER ACTUATOR

- Disconnect vacuum hose from solenoid valve to the actuator diaphragm.

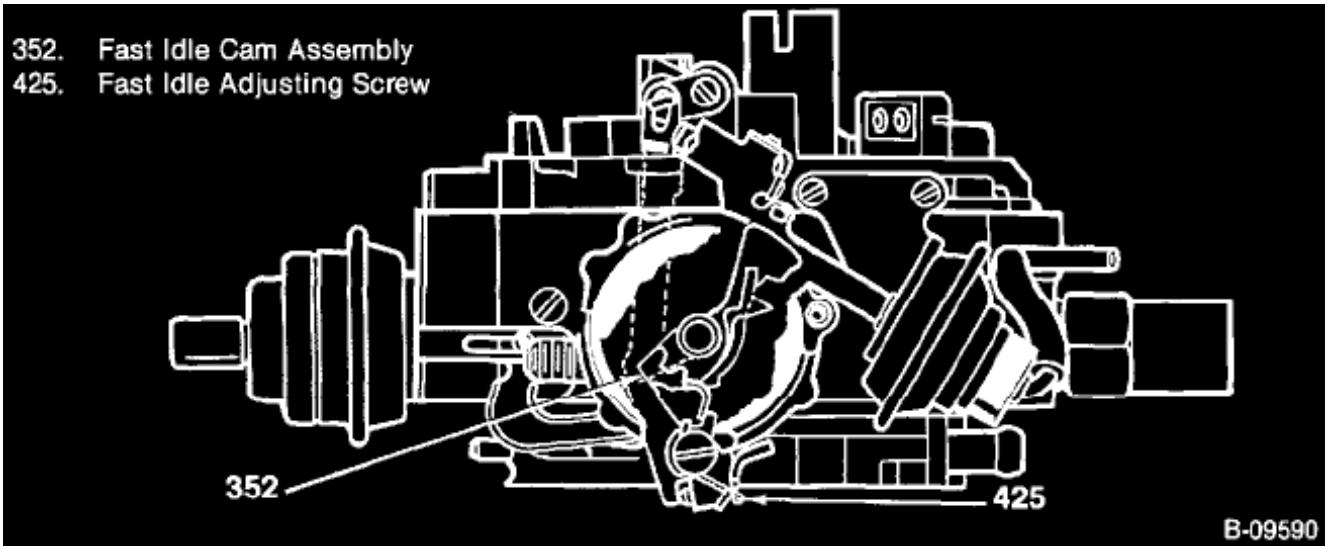
- Connect an external vacuum source to the diaphragm and apply 20 inches of vacuum.



- Manually open the throttle slightly and allow it to close against the extended actuator plunger. With engine warm, idle speed should be:

Federal - 1500 rpm California - 1600 rpm

NOTE: The throttle lever actuator is designed to control emissions by holding the throttle open slightly during deceleration and coasting.



Idle Speed: Adjustments Fast Idle Speed

Carbureted

Fast Idle Adjustment

Check and, if necessary, adjust ignition timing before adjusting fast idle speed. Make all adjustments with engine at normal operating temperature, choke fully open, air cleaner installed and A/C control off, if equipped.

1. Disconnect and plug vacuum hoses as directed on vehicle emission control label.

2. Position fast idle screw on specified step of fast idle cam as directed on vehicle emission control label.

3. Turn fast idle screw in or out and adjust fast idle speed to specifications.

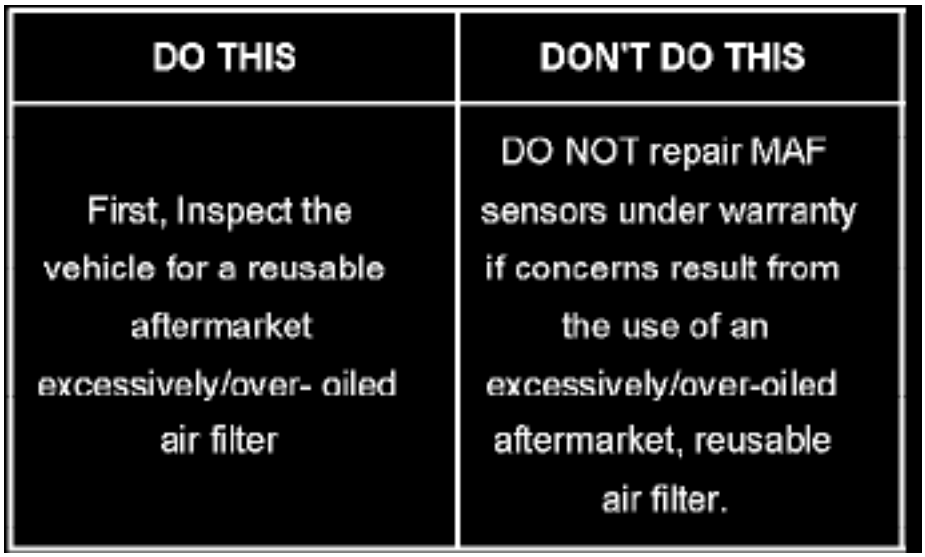
With Carburator Only

Check and, if necessary, adjust ignition timing before adjusting fast idle speed. Make all adjustments with engine at normal operating temperature, choke fully open, air cleaner installed and A/C control off, if equipped.

1. Disconnect and plug vacuum hoses as directed on vehicle emission control label.

2. Position fast idle screw on specified step of fast idle cam as directed on vehicle emission control label.

3. Turn fast idle screw in or out and adjust fast idle speed to specifications.



Air Filter Element: Customer Interest Engine, A/T - Shift/Driveability Concerns/MIL ON

Bulletin No.: 04-07-30-013B

Date: February 01, 2007

INFORMATION

Subject: Automatic Transmission Shift, Engine Driveability Concerns or Service Engine Soon (SES) Light On as a Result of the Use of an Excessively/Over-Oiled Aftermarket, Reusable Air Filter

Models: 2007 and Prior GM Cars and Light Duty Trucks 2007 and Prior Saturn Models 2003-2007 HUMMER H2 2006-2007 HUMMER H3 2005-2007 Saab 9-7X

Supercede:

This bulletin is being revised to add models and model years. Please discard Corporate Bulletin Number 04-07-30-013A (Section 07 - Transmission/Transaxle).

The use of an excessively/over-oiled aftermarket, reusable air filter may result in:

Service Engine Soon (SES) light on

Transmission shift concerns, slipping and damaged clutch(es) or band(s)

Engine driveability concerns, poor acceleration from a stop, limited engine RPM range

The oil that is used on these air filter elements may be transferred onto the Mass Air Flow (MAF) sensor causing contamination of the sensor. As a result, the Grams per Second (GPS) signal from the MAF may be low and any or all of the concerns listed above may occur.

When servicing a vehicle with any of these concerns, be sure to check for the presence of an aftermarket reusable, excessively/over-oiled air filter. The MAF, GPS reading should be compared to a like vehicle with an OEM air box and filter under the same driving conditions to verify the concern.

The use of an aftermarket reusable air filter DOES NOT void the vehicle's warranty.

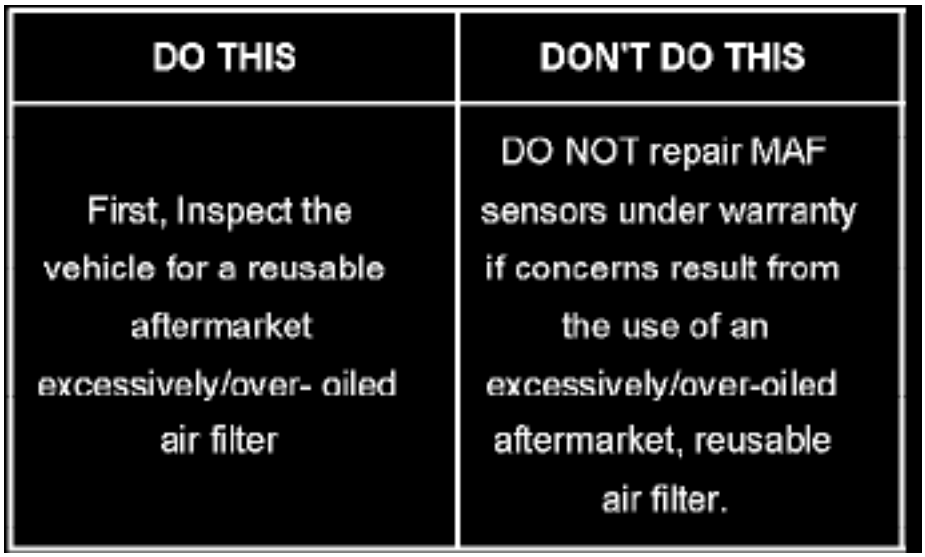
If an aftermarket reusable air filter is used, technicians should inspect the MAF sensor element and the air induction hose for contamination of oil prior to making warranty repairs.

Transmission or engine driveability concerns (related to the MAF sensor being contaminated with oil) that are the result of the use of an aftermarket reusable, excessively/over-oiled air filter are not considered to be warrantable repair items.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer



Air Filter Element: All Technical Service Bulletins Engine, A/T - Shift/Driveability Concerns/MIL ON

Bulletin No.: 04-07-30-013B

Date: February 01, 2007

INFORMATION

Subject: Automatic Transmission Shift, Engine Driveability Concerns or Service Engine Soon (SES) Light On as a Result of the Use of an Excessively/Over-Oiled Aftermarket, Reusable Air Filter

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WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer

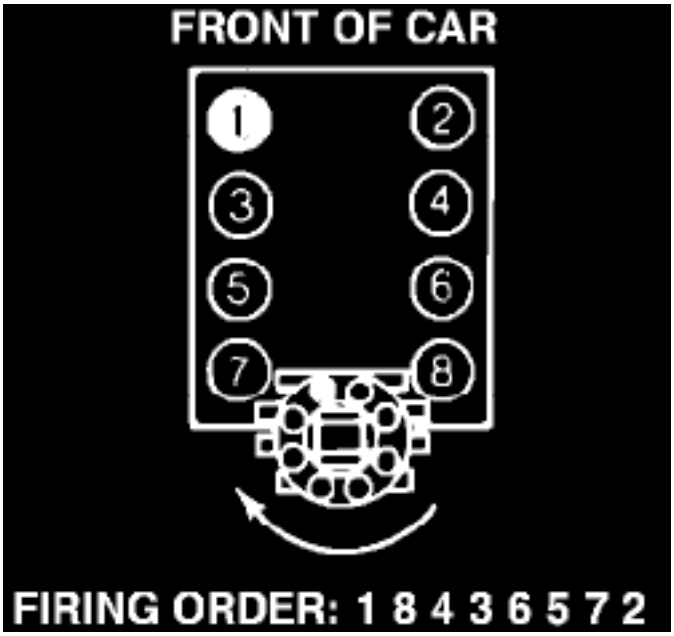
Fuel Pressure Release: Service and Repair

Throttle Body Injected Engines

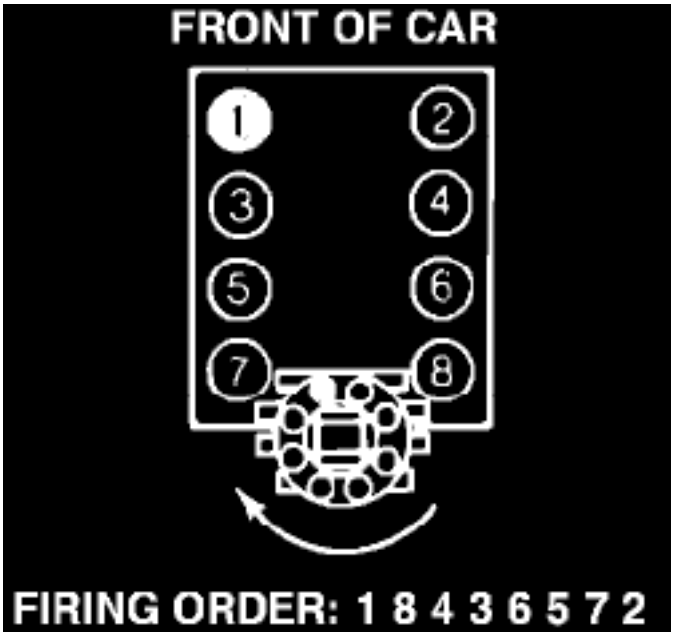
1. Remove fuel pump fuse from fuse box. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and replace fuel pump fuse.

Port Injected Engines

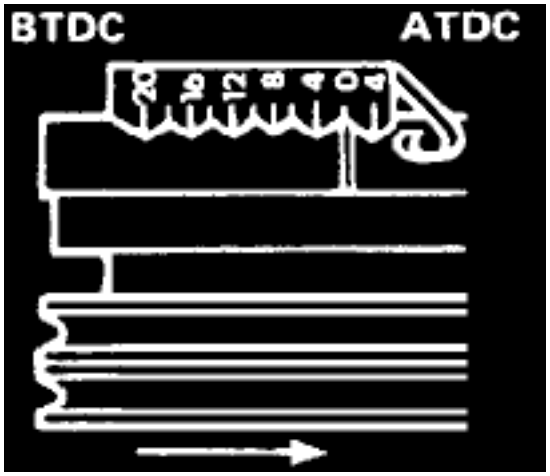
1. Disconnect fuel tank harness connector. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and reconnect fuel tank harness connector.



FIRING ORDER



FIRING ORDER


BTDC
ATDC

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Tune-up and Engine Performance Checks > Spark Plug Wire <--> [Ignition Cable] > Component Information > Technical Service Bulletins > Customer Interest for Spark Plug Wire: > 93356D > Oct > 92 > Engine - Miss, Hesitation, or Roughness

Spark Plug Wire: Customer Interest Engine - Miss, Hesitation, or Roughness

Number: 93-35-6D Section: 6D Date: OCT. 1992 Corporate Bulletin No.: 716404R ASE No.: A1, A8

Subject: ENGINE MISS HESITATION OR ROUGHNESS DUE TO PIERCED SECONDARY IGNITION COMPONENTS

Model and Year: 1980-93 ALL PASSENGER CARS AND TRUCKS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 87-121, DATED MAY 1987. THE 1989-93 MODEL YEARS HAVE BEEN ADDED. ALL COPIES OF 87-121 SHOULD BE DISCARDED.

During the diagnosis procedure for an engine miss, hesitation or roughness, a spark plug or spark plug wire condition may be suspected. Several types of commercial or homemade diagnostic equipment required the secondary ignition boots or wire to be pierced. This is normally done to check for spark plug firing or to perform a cylinder balance test. Similarly the use of pliers or other such tools to disengage a spark plug boot may pierce or damage the boot or wire. Secondary ignition components should not be pierced for any reason.

Piercing a spark plug wire and/or distributor boot may create a condition that will not be immediately apparent. Over time, the hole in the pierced boot may allow a ground path to develop creating a plug misfire condition. Heavily moisture laden air in the vicinity of the pierced boot may accelerate this effect.

Piercing a secondary ignition wire creates a gap in the wire's conductive core. This gap is a point of high resistance. The current flow in the wire will increase to compensate for the higher wire resistance. Over time, the wire may fail creating a plug misfire condition. The time required for the condition to appear depends upon the extent of damage to the conductive core.

To help prevent future condition that are spark plug wire related, do not pierce or otherwise damage any secondary ignition component. Only use diagnostic equipment containing an inductive pick-up to check for spark plug firing or to perform cylinder balance tests. When disengaging a spark plug boot from the spark plug, twist the flanged boot 1/2 turn then pull on the boot only to remove the wire.

Spark Plug Wire: All Technical Service Bulletins Engine - Miss, Hesitation, or Roughness

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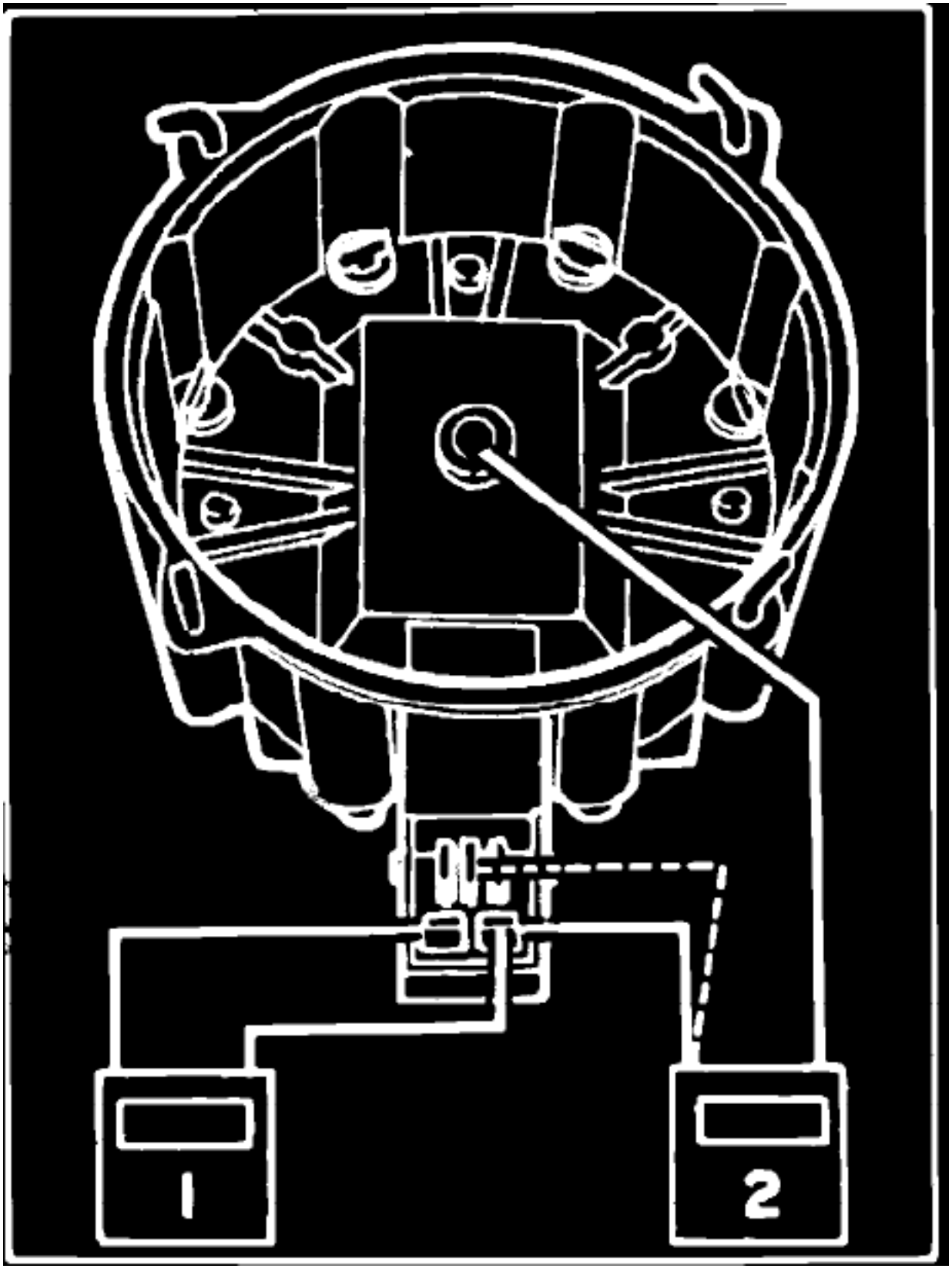
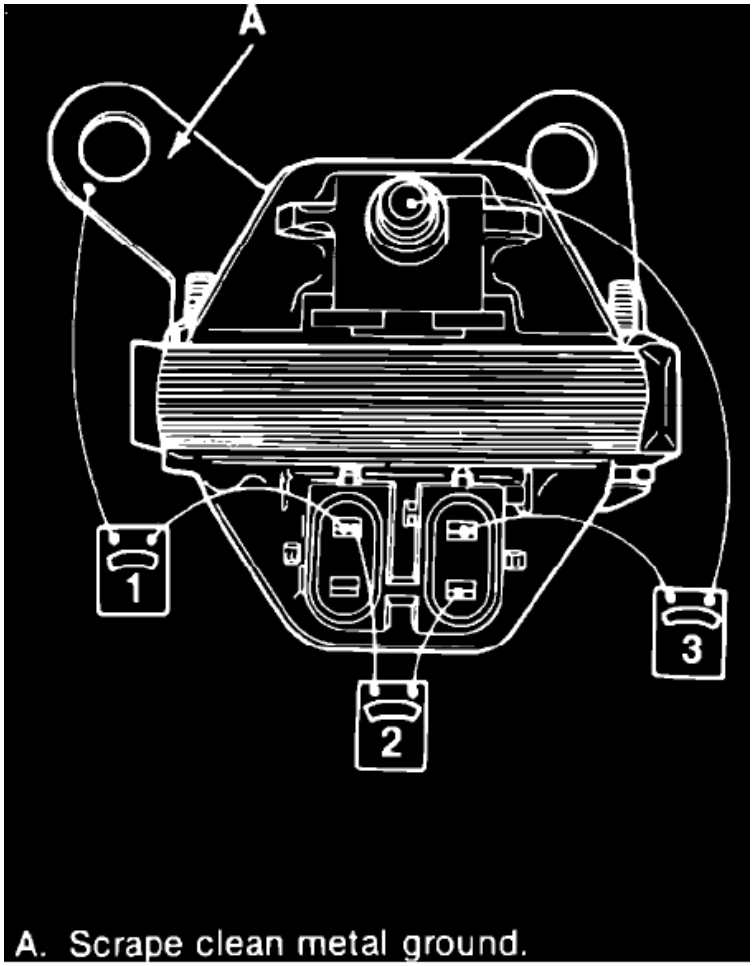

1
2

Distributor: Testing and Inspection

Fig. 10 Ignition coil test connections. Models w/internal coil


A
1
2
3
A. Scrape clean metal ground.

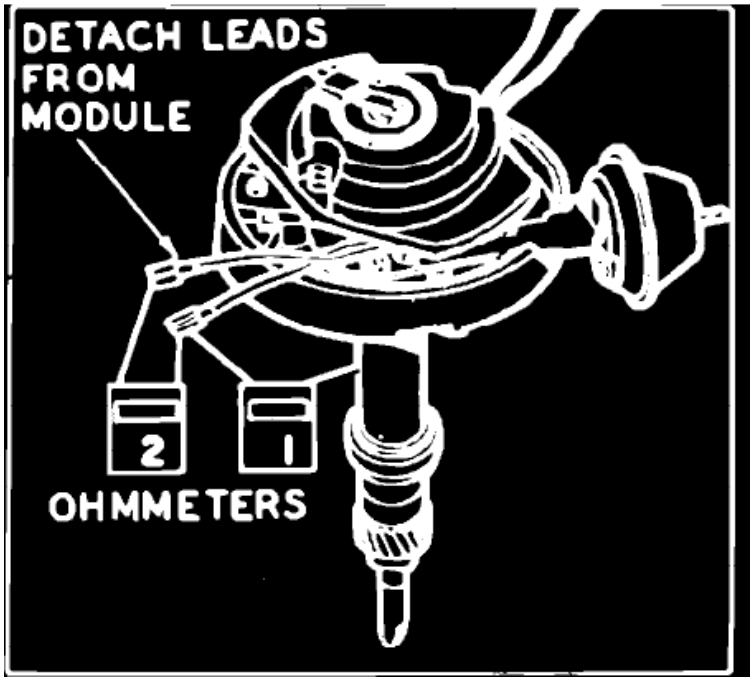

DETACH LEADS FROM MODULE
2
1
OHMMETERS

Fig. 11 Ignition coil test connections. Models w/remote coil

Fig. 12 Pickup coil (pole piece) test connections

Tester J-24624 is required to test the module. If this tester is not available, and malfunction still exists after performing the following checks, replace

module.

1. Remove distributor cap and coil assembly, as equipped.

2. Inspect cap, coil and rotor for arcing, carbon tracking and damage, and replace as needed.

3. On models with integral coil, proceed as follows:

a. Connect ohmmeter, Fig. 10, step 1. If reading is other than zero or very near to zero, the ignition coil must be replaced. b. If no ohmmeter reading was observed in step 1, reconnect ohmmeter both ways, Fig. 10, step 2. If both ohmmeter readings are infinite on

high scale, replace ignition coil.

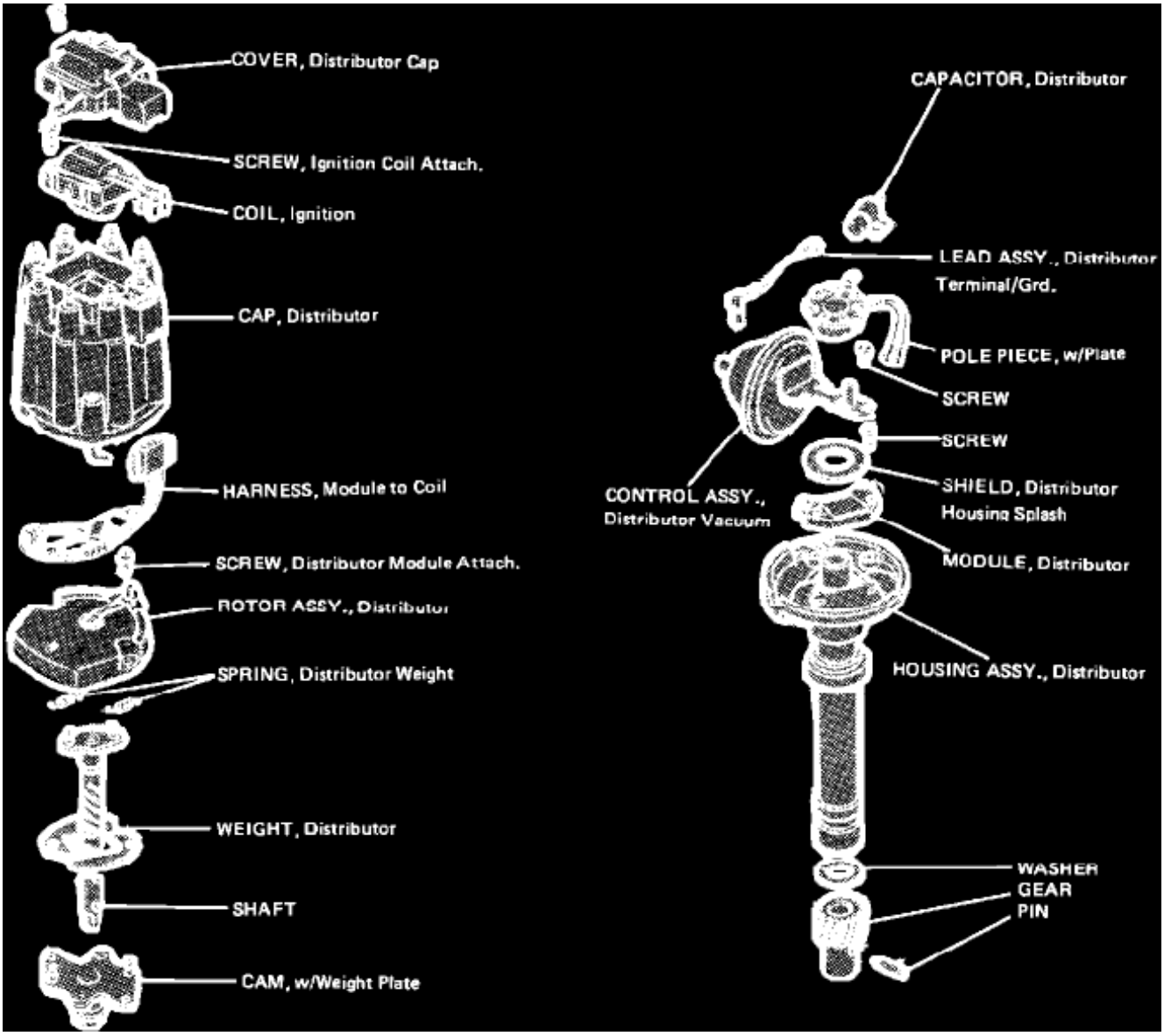
4. On models with remote coil, proceed as follows:

a. Connect ohmmeter, Fig. 11, step 1. If reading is not infinite, replace coil. b. Connect ohmmeter, Fig. 11, step 2. If reading is not zero or near zero, replace coil. c. Connect ohmmeter, Fig. 11, step 3. If reading is infinite, replace coil.

5. Connect an external vacuum source to the vacuum advance unit. Replace vacuum unit if inoperative.

6. If vacuum unit is operating properly, connect ohmmeter, Fig. 12, step 1. If ohmmeter reading on middle scale is not infinite at all times, pickup coil must be replaced.

7. With ohmmeter connected, Fig. 12, step 2, reading should be 500 to 1500 ohms.



Distributor: Service and Repair Distributor Service

Fig. 15 Typical High Energy Ignition (HEI) distributor exploded view

DISASSEMBLY

1. Remove distributor as outlined, then remove rotor, Fig. 15.

2. Remove advance springs and weights (if equipped).

3. Remove module retaining screws and move module to a position where connector may be removed.

4. Remove wires from module terminals.

5. Support distributor gear so that distributor shaft will not be damaged, then remove roll pin by driving it out with a punch.

6. Remove gear, shim and tanged washer from shaft. Remove any burrs that may have been caused by removal of roll pin. Some distributors do not use a shim or tanged washer.

7. Remove distributor shaft and magnet assembly.

8. Remove pole piece retaining screws, pole piece, magnet and pickup coil.

9. Remove lock ring from top of housing, pickup coil retainer and felt washer.

10. Remove vacuum advance unit (if equipped).

11. Remove capacitor and wiring harness from distributor housing.

ASSEMBLY

1. Install vacuum advance unit (if used) and secure with two screws, Fig. 15.

2. Place felt washer over lubricant reservoir at top of housing.

3. Position pick up coil retainer onto housing with vacuum advance arm over actuating pin of vacuum advance mechanism and secure with lock ring.

4. Install pick up coil magnet and pole piece. Loosely install the three retaining screws.

5. Install distributor shaft and rotate to check for even clearance all around between pole piece and shaft projections.

6. Move pole piece to provide even clearance and secure with three retaining screws.

7. Install drive onto shaft with teeth facing up. Drive gear has a dimple on one side next to drive pin hole. Align drive gear so that dimple is on same

side of shaft as the rotor pointer. Temporarily install rotor to ensure correct alignment.

8. Install tanged washer, shim and drive gear, then retain with a new roll pin.

9. Install capacitor and loosely install retaining screw.

10. Install connector on module with tab on top, then liberally apply silicone grease to bottom of module and install screws. Failure to apply silicone grease to module will cause excessive heat build up of module and premature failure.

11. Position wiring harness with grommet in housing notch, then connect pink wire to capacitor stud and black wire to capacitor retaining screw. Tighten screw.

12. Reconnect wires to module, then install centrifugal advance weights and springs.

Distributor: Service and Repair Distributor Replace

UNITS W/INTEGRAL COIL

Removal

1. Disconnect electrical connectors from distributor cap and disconnect 4 wire EST connector. Carefully bend connector locking tabs away from housing by hand to prevent damage to locking tabs.

2. Remove distributor cap assembly leaving plug wires connected and position cap aside.

3. Remove No. 1 spark plug, crank engine until compression pressure can be felt in No. 1 cylinder, then slowly rotate crankshaft until timing marks are aligned at TDC on compression stroke for No. 1 cylinder.

4. Disconnect battery ground cable, then mark position of distributor body in relation to engine and position of rotor contact in relation to distributor body.

5. Remove distributor hold-down bolt, raise distributor noting rotor rotation, place second mark on distributor housing to indicate position where rotor stops moving, then remove distributor. Do not rotate crankshaft with distributor removed from engine.

Installation

1. Ensure No. 1 cylinder is at TDC on compression stroke as outlined in removal procedure.

2. Align rotor with second mark made in step 5 of removal procedure.

3. Insert distributor into engine, aligning body with mark made on engine prior to removal, then seat distributor in engine. With distributor fully seated, marks made in step 4 of removal procedure should be aligned. If distributor will not seat against boss on engine, oil pump driveshaft may have to be rotated slightly to allow proper installation.

4. Install hold-down clamp and hand tighten retaining bolt.

5. Reverse remaining procedure to complete installation, then adjust ignition timing as outlined.

UNITS W/REMOTE COIL

Removal

1. Disconnect distributor harness and feed wire connectors from ignition coil and disconnect EST connector.

2. Remove distributor cap leaving plug wires connected and position cap aside.

3. Remove No. 1 spark plug, crank engine until compression pressure can be felt in No. 1 cylinder, then slowly rotate crankshaft until timing marks are aligned at TDC on compression stroke for No. 1 cylinder.

4. Disconnect battery ground cable, then mark position of distributor body in relation to engine and position of rotor contact in relation to distributor body.

5. Remove distributor hold-down bolt, raise distributor noting rotor rotation, place second mark on distributor housing to indicate position where rotor stops moving, then remove distributor. Do not rotate crankshaft with distributor removed from engine.

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Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Tune-up and Engine Performance Checks > Spark Plug > Component Information > Technical Service Bulletins > Customer Interest for Spark Plug: > 86B77 > Apr > 86 > Engine - Spark Knock, Poor Performance

Spark Plug: Customer Interest Engine - Spark Knock, Poor Performance

NUMBER: 86-B-77

GROUP: 6D - Engine Electrical

DATE: April, 1986

SUBJECT: SPARK KNOCK (PREIGNITION)

MODELS: 1984-85 C, K, G TRUCKS EQUIPPED WITH THE LE9 5.0L, LF3 5.0L, OR LS9 5.7L ENGINE AND ELECTRIC SPARK CONTROL (ESC) FEDERAL EMISSIONS AND ELECTRONIC SPARK TIMING (EST) CALIFORNIA EMISSIONS.

THIS BULLETIN CANCELS AND SUPERSEDES 86-B-21 (DECEMBER, 1985) ALL COPIES OF WHICH SHOULD BE DESTROYED.

Some 1984-85 vehicles equipped with the LE9 5.0L (VIN Code H), LF3 5.0L (VIN Code F), or LS9 5.7L (VIN Code L) engine may experience detonation (preignition) or poor performance when operating in a loaded condition or pulling a grade. As a result of the preignition, the ESC (Federal) or EST (California) retards the spark timing, and a noticeable reduction in performance may occur. In the event the preignition condition is not corrected by the ESC/EST spark retard, continued operation under these conditions could result in internal engine damage. To reduce the possibility of this occurrence, the spark plugs should be changed to a colder heat range. When these conditions exist, the original equipment (R44TS) spark plugs should be replaced with R43CTS (P/N 5613810). The correct spark plug gap is .045". Starting with 1986 vehicles, the LE9, LF3, LS9, and LT9 engines are built with the R43CTS spark plugs.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Tune-up and Engine Performance Checks > Spark Plug > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Spark Plug: > 86B77 > Apr > 86 > Engine - Spark Knock, Poor Performance

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Spark Plug: Specifications

Plug Tightening Torque 22 ft.lb

Engine	Year	Gap (inches)	Gap (mm)	Torque (ft-lb)
4-cyl. 1.9L (119)	1982-86	.044	1.1	—
4-cyl. 2.0L (122)	1983-84	.035	.89	7-15
4-cyl. 2.5L (151)	1985-90	.060	1.52	7-15
V-6 2.8L, 3.8L	1982-90	.045	1.14	7-15
V-6 4.3L	1985-90	.035	.89	7-15
6-cyl.	1981-89	.035	.89	17-27
8-cyl.	1981-86	.045	1.14	17-27
8-cyl.: Light Duty	1987-88	.035	.89	22
Heavy Duty	1987-88	.045	1.14	22
8-cyl.	1989-90	.035	.89	22

SPARK PLUGS

Compression Check: Specifications

Minimum, 698 kPa (100 psi) @ 200 rpm. The lowest cylinder reading should not be less than 80% of the highest. Perform compression test with engine at normal operating temperature, spark plugs removed and throttle wide open.

Valve Clearance: Specifications

FRONT TO REAR 6-250, 292.....
.....E-I-I-E-E-I-I-E-E-I-I-E V6-231.....
.....
.....E-I-I-E-I-E V6-262 Left Side.....
.....E-I-E-I-I-E Right Side.....
.....
.....E-I-I-E-I-E V8-267, 305, 350, 400.....
.....E-I-I-E-E-I-I-E V8-454....
.....
.....E-I-E-I-E-I-E-I

Valve Clearance: Adjustments

STATIC ADJUSTMENT

NOTE: This procedure does not apply to 231 V-6 engines.

1. Start engine and allow to reach normal operating temperature, then shut engine off.

2. With engine in position to fire No. 1 cylinder, adjust the following valves: V6-229 and 262, Exhaust Nos. 1, 5 and 6; Intake Nos. 1, 2 and 3. 6-250 and 292, Exhaust Nos. 1, 3 and 5; Intake Nos. 1, 2 and 4. V8 engines, Exhaust Nos. 1, 3, 4 and 8; Intake Nos. 1, 2, 5 and 7. To properly adjust valves, tighten adjusting nut until all lash is eliminated, then tighten nut the specified additional number of turns. On V8-454 / 7.4L engine, tighten nut 3/4 additional turn from zero lash. On all others, tighten nut one full turn from zero lash.

3. Turn crankshaft one complete revolution, which will bring engine in position to fire cylinders 4(V6) or 6(Inline 6 and V8). With engine in this position, adjust the following valves: V6-229 and 262, Exhaust Nos. 2, 3 and 4; Intake Nos. 4, 5 and 6. 6-250 and 292, Exhaust Nos. 2, 4 and 6; Intake Nos. 3, 5 and 6. V8 engines, Exhaust Nos. 2, 5, 6 and 7; Intake Nos. 3, 4, 6 and 8. When zero lash is obtained, tighten adjusting nuts as specified in step 2.

ENGINE RUNNING ADJUSTMENT

NOTE: The following procedure, performed with the engine running, should be done only in case readjustment is required.

1. After engine has been warmed to operating temperature, remove valve cover and install a new valve cover gasket.

2. With engine running at idle speed, back off valve rocker arm nut until rocker arm starts to clatter.

3. Turn rocker arm nut down slowly until the clatter just stops. This is the zero lash position.

4. Turn nut down 1/4 additional turn and pause 10 seconds until engine runs smoothly. Repeat additional 1/4 turns, pausing 10 seconds each time, until nut has been turned down the specified number of turns from the zero lash position. This preload adjustment must be done slowly to allow the lifter to adjust itself to prevent the possibility of interference between the intake valve head and top of piston, which might result in internal damage and/or bent pushrods. Noisy lifters should be replaced.

Drive Belt: Customer Interest A/C - Belt Wear, Low Mileage

CHEVROLET NUMBER: 86-T-204

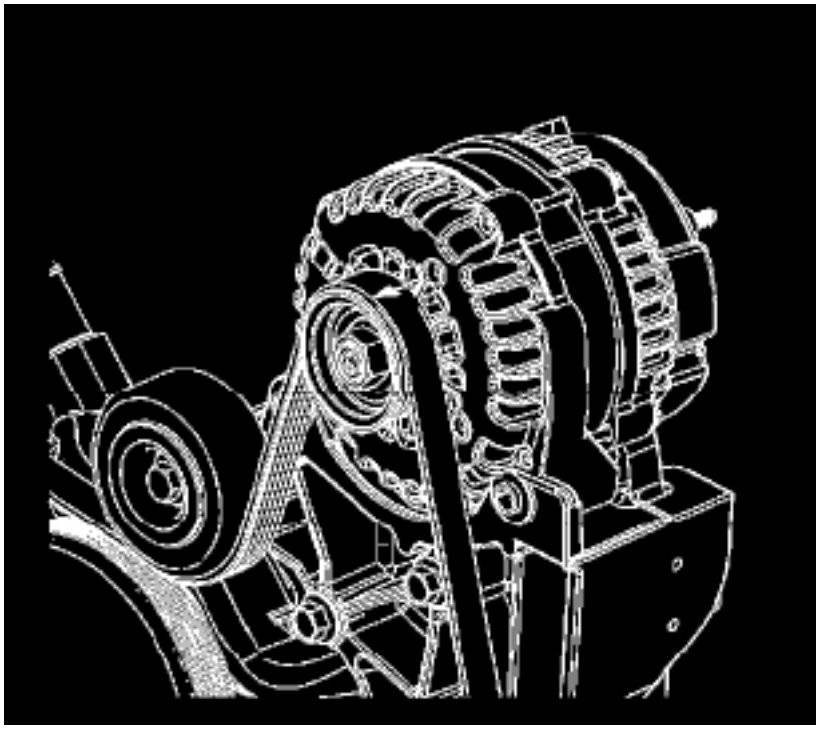
SECTION: 6B - Engine Cooling

DATE: December, 1986

SUBJECT: INCORRECT AIR CONDITIONING COMPRESSOR BELT

MODELS: 1985-86 G VANS EQUIPPED WITH 4.3L (VIN CODE N), 5.0L (VIN CODES H,F), OR 5.7L (VIN CODE L) ENGINE

Some 1985-86 G vans equipped with the 4.3L, 5.0L, or 5.7L engine and air conditioning (A/C) may experience low mileage A/C compressor belt wear. This condition may be caused by an incorrect belt being installed during production of the vehicle. The incorrect A/C belt (3/8" x 55") has a center cordline (CCL) too low in the belt cross section which can cause overloading of the belt. A new A/C belt (3/8" x 54.5" "High Ride") which has a higher CCL has been released for service use. If this condition is encountered, replace the A/C compressor belt with P/N 469594. Tighten belt to 645 N (145 lb.) using belt tension gauge J-23600-B or BT 33-95-ACBN. Refer to the belt replacement procedures in the Light Duty Service Manual, Section 6B, Engine Cooling.



Drive Belt: All Technical Service Bulletins Engine - Drive Belt Misalignment Diagnostics

INFORMATION

Bulletin No.: 08-06-01-008A

Date: July 27, 2009

Subject: Diagnosing Accessory Drive Belt / Serpentine Belt Noise and Availability and Use of Kent-Moore EN-49228 Laser Alignment Tool - Drive Belt

Models:

2010 and Prior GM Passenger Cars and Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 Vehicles 2009 and Prior Saab 9-7X

Supercede: This bulletin is being revised to add a model year and update the Tool Information. Please discard Corporate Bulletin Number 08-06-01-008 (Section 06 - Engine).

Background

Several aftermarket companies offer laser alignment tools for accessory drive systems that can be very helpful in eliminating drive belt noise as a result of misaligned pulleys. Typically pricing ranges from $160 - $200.

EN-49228 Laser Alignment Tool - Drive Belt

The GM Tool program has now made available a competitive, simple to use and time-saving laser tool to assist in achieving precise alignment of the drive belt pulleys. This optional tool removes the guesswork from proper pulley alignment and may serve to reduce comebacks from:

- Drive Belt Noise

- Accelerated Drive Belt Wear

- Drive Belt Slippage

Instructions

The instructions below are specific only to the truck Gen IV V-8 family of engines. These instructions are only for illustrative purposes to show how the tool may be used. Universal instructions are included in the box with the Laser Alignment Tool - Drive Belt.

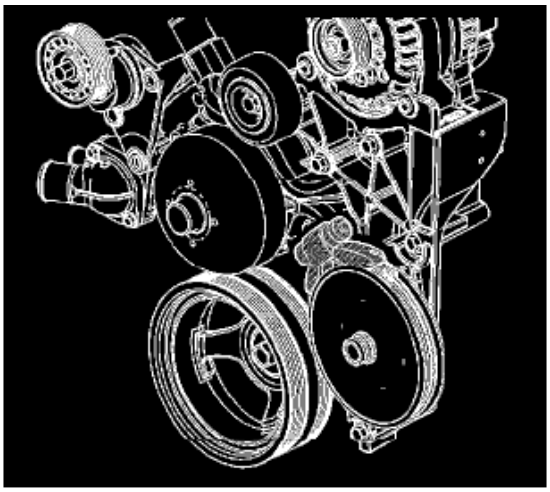
Caution

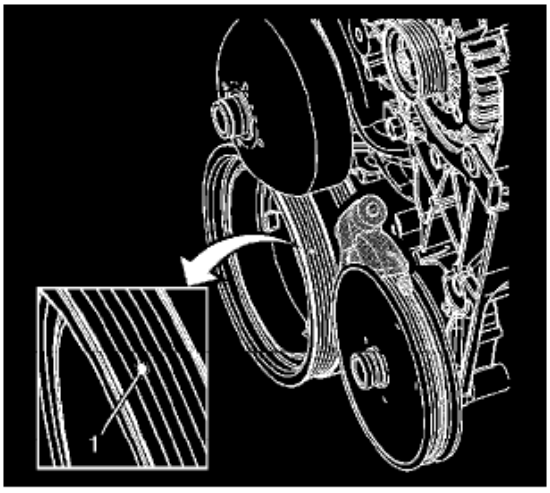
- Do not look directly into the beam projected from the laser.

- Use caution when shining the laser on highly polished or reflective surfaces. Laser safety glasses help reduce laser beam glare in many circumstances.

- Always use laser safety glasses when using the laser. Laser safety glasses are not designed to protect eyes from direct laser exposure.

1. Observe and mark the serpentine belt orientation.





GM Tool Number	Description
EN-49228	Laser Alignment Tool - Drive Belt

2. Remove the serpentine belt from the accessory drive system.

3. Install the tool onto the power steering pulley. Position the legs of the tool into the outer grooves of the pulley, farthest from the front of the

engine.

4. Install the retaining cord around the pulley and to the legs of the tool.

5. Put on the laser safety glasses provided with the tool. 6. Depress the switch on the rear of the tool to activate the light beam. 7. Rotate the power steering pulley as required to project the light beam onto the crankshaft balancer pulley grooves. 8. Inspect for proper power steering pulley alignment.

- If the laser beam projects onto the second rib or raised area (1), the pulleys are aligned properly.

- If the laser beam projects more than one-quarter rib 0.9 mm (0.035 in) mis-alignment, adjust the position of the power steering pulley as required.

- Refer to SI for Power Steering Pulley Removal and Installation procedures.

9. Install the serpentine belt to the accessory drive system in the original orientation.

10. Operate the vehicle and verify that the belt noise concern is no longer present.

Tool Information

Please visit the GM service tool website for pricing information or to place your order for this tool.

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WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Drive Belt > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Drive Belt: > 86T204 > Dec > 86 > A/C - Belt Wear, Low Mileage

Drive Belt: All Technical Service Bulletins A/C - Belt Wear, Low Mileage

CHEVROLET NUMBER: 86-T-204

SECTION: 6B - Engine Cooling

DATE: December, 1986

SUBJECT: INCORRECT AIR CONDITIONING COMPRESSOR BELT

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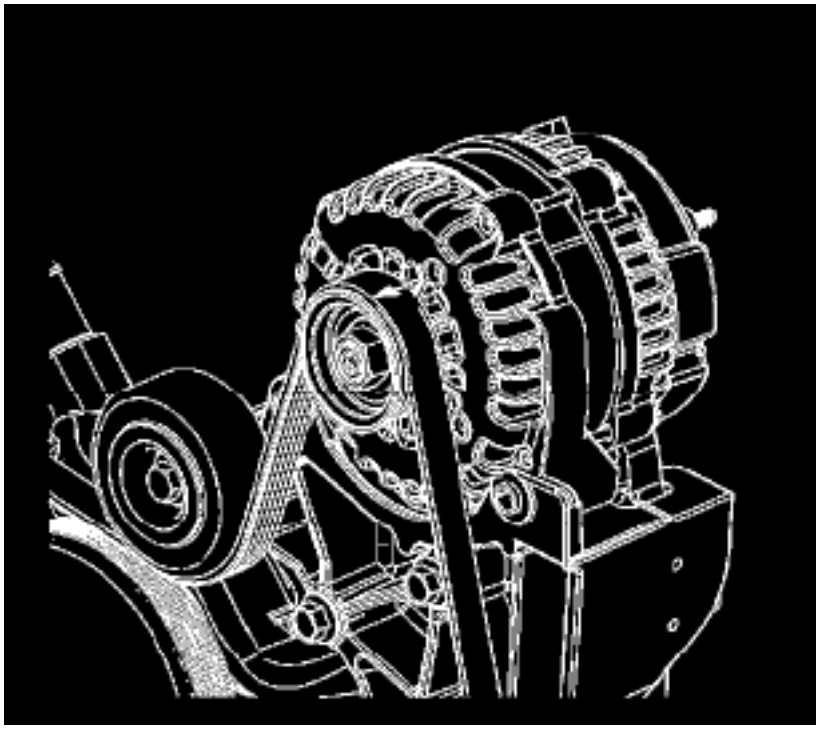

Drive Belt: All Technical Service Bulletins Engine - Drive Belt Misalignment Diagnostics

INFORMATION

Bulletin No.: 08-06-01-008A

Date: July 27, 2009

Subject: Diagnosing Accessory Drive Belt / Serpentine Belt Noise and Availability and Use of Kent-Moore EN-49228 Laser Alignment Tool - Drive Belt

Models:

2010 and Prior GM Passenger Cars and Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 Vehicles 2009 and Prior Saab 9-7X

Supercede: This bulletin is being revised to add a model year and update the Tool Information. Please discard Corporate Bulletin Number 08-06-01-008 (Section 06 - Engine).

Background

Several aftermarket companies offer laser alignment tools for accessory drive systems that can be very helpful in eliminating drive belt noise as a result of misaligned pulleys. Typically pricing ranges from $160 - $200.

EN-49228 Laser Alignment Tool - Drive Belt

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- Drive Belt Slippage

Instructions

The instructions below are specific only to the truck Gen IV V-8 family of engines. These instructions are only for illustrative purposes to show how the tool may be used. Universal instructions are included in the box with the Laser Alignment Tool - Drive Belt.

Caution

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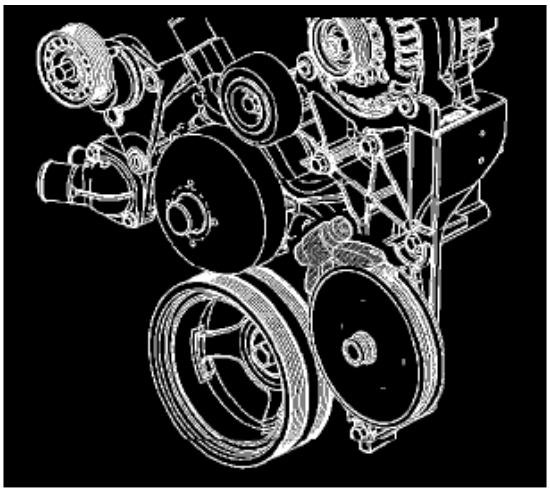

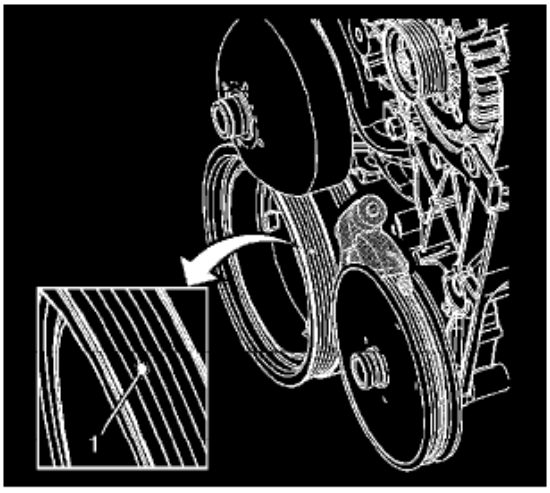

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WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer

A belt operated one engine revolution is considered a used belt.

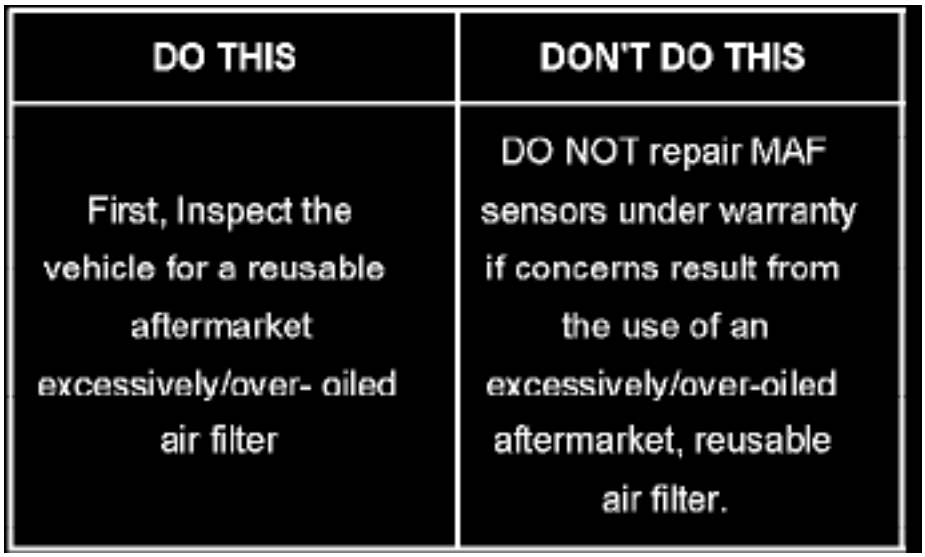
Engine	Year	Alternator	Power Steering	Air Cond.	Air Pump
Strand Tension					
USED BELTS					
5.7L (350) Diesel:					
5/16"	1981	50	50	50	50
3/8"	1981	70	70	70	70
15/32"	1981	90	90	90	90
All Others	1981	70-80	70-80	90-100	70-80
2.8L (173)	1982-86	65-80	65-80	65-80	45
6.2L (379)	1982-86	70-80	70-80	90-100	—
All Others	1982-86	70-80	70-80	90-100	70-80
4.8L (292)	1987-89	90	90	90	90
V6, V8 Gasoline	1987-90	90	67	90	67
V8 Diesel	1987-90	67	67	90	—
All Serpentine	1985-90	*	*	*	—

BELT TENSION

Engine	Year	Alternator	Power Steering	Air Cond.	Air Pump
NEW BELTS					
5.7L (350) Diesel:					
5/16"	1981	80	80	80	80
3/8"	1981	140	140	140	140
15/32"	1981	165	165	165	165
All Others	1981-86	120-130	120-130	135-145	120-130
4.8L (292)	1987-89	169	169	169	169
V6, V8 Gasoline	1987-90	135	146	169	146
V8 Diesel	1987-90	146	146	169	—
All Serpentine	1985-90	*	*	*	—

* Serpentine, automatic tensioner.

BELT TENSION



DO THIS	DON'T DO THIS
First, Inspect the vehicle for a reusable aftermarket excessively/over- oiled air filter	DO NOT repair MAF sensors under warranty if concerns result from the use of an excessively/over-oiled aftermarket, reusable air filter.

Air Filter Element: Customer Interest Engine, A/T - Shift/Driveability Concerns/MIL ON

Bulletin No.: 04-07-30-013B

Date: February 01, 2007

INFORMATION

Subject: Automatic Transmission Shift, Engine Driveability Concerns or Service Engine Soon (SES) Light On as a Result of the Use of an Excessively/Over-Oiled Aftermarket, Reusable Air Filter

Models: 2007 and Prior GM Cars and Light Duty Trucks 2007 and Prior Saturn Models 2003-2007 HUMMER H2 2006-2007 HUMMER H3 2005-2007 Saab 9-7X

Supercede:

This bulletin is being revised to add models and model years. Please discard Corporate Bulletin Number 04-07-30-013A (Section 07 - Transmission/Transaxle).

The use of an excessively/over-oiled aftermarket, reusable air filter may result in:

Service Engine Soon (SES) light on

Transmission shift concerns, slipping and damaged clutch(es) or band(s)

Engine driveability concerns, poor acceleration from a stop, limited engine RPM range

The oil that is used on these air filter elements may be transferred onto the Mass Air Flow (MAF) sensor causing contamination of the sensor. As a result, the Grams per Second (GPS) signal from the MAF may be low and any or all of the concerns listed above may occur.

When servicing a vehicle with any of these concerns, be sure to check for the presence of an aftermarket reusable, excessively/over-oiled air filter. The MAF, GPS reading should be compared to a like vehicle with an OEM air box and filter under the same driving conditions to verify the concern.

The use of an aftermarket reusable air filter DOES NOT void the vehicle's warranty.

If an aftermarket reusable air filter is used, technicians should inspect the MAF sensor element and the air induction hose for contamination of oil prior to making warranty repairs.

Transmission or engine driveability concerns (related to the MAF sensor being contaminated with oil) that are the result of the use of an aftermarket reusable, excessively/over-oiled air filter are not considered to be warrantable repair items.

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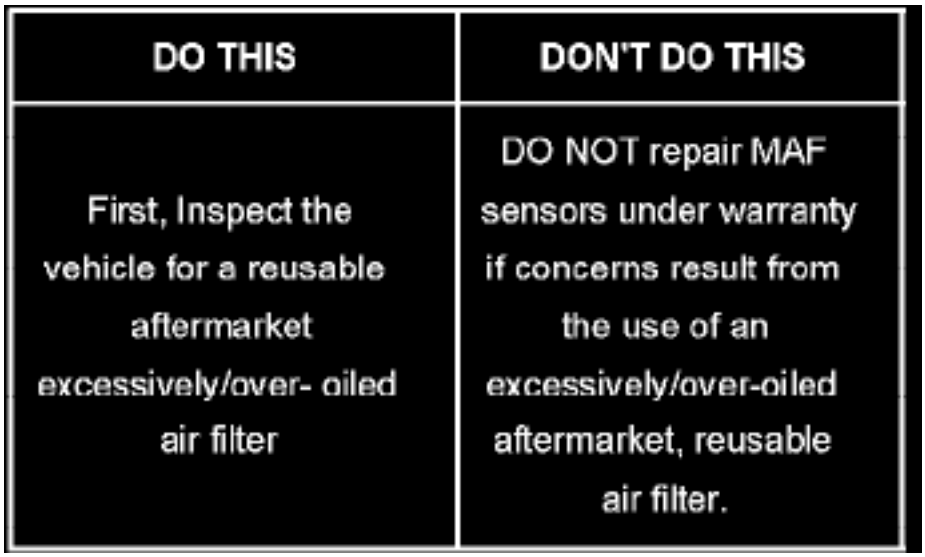
WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer



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Bulletin No.: 04-07-30-013B

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WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer

Spark Plug: All Technical Service Bulletins Engine - Spark Knock, Poor Performance

NUMBER: 86-B-77

GROUP: 6D - Engine Electrical

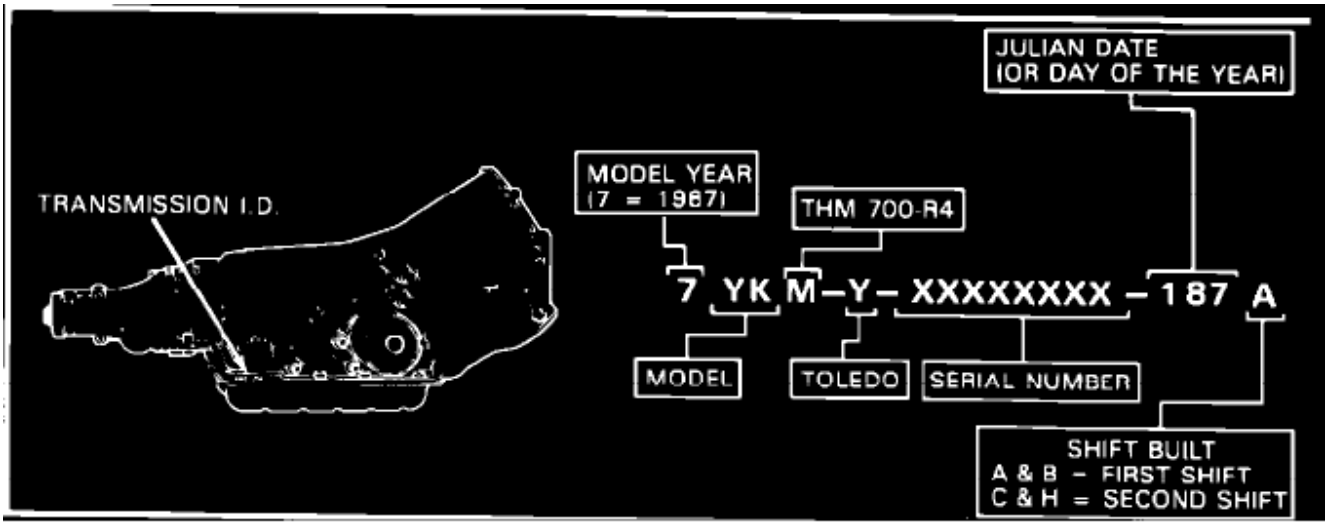
DATE: April, 1986

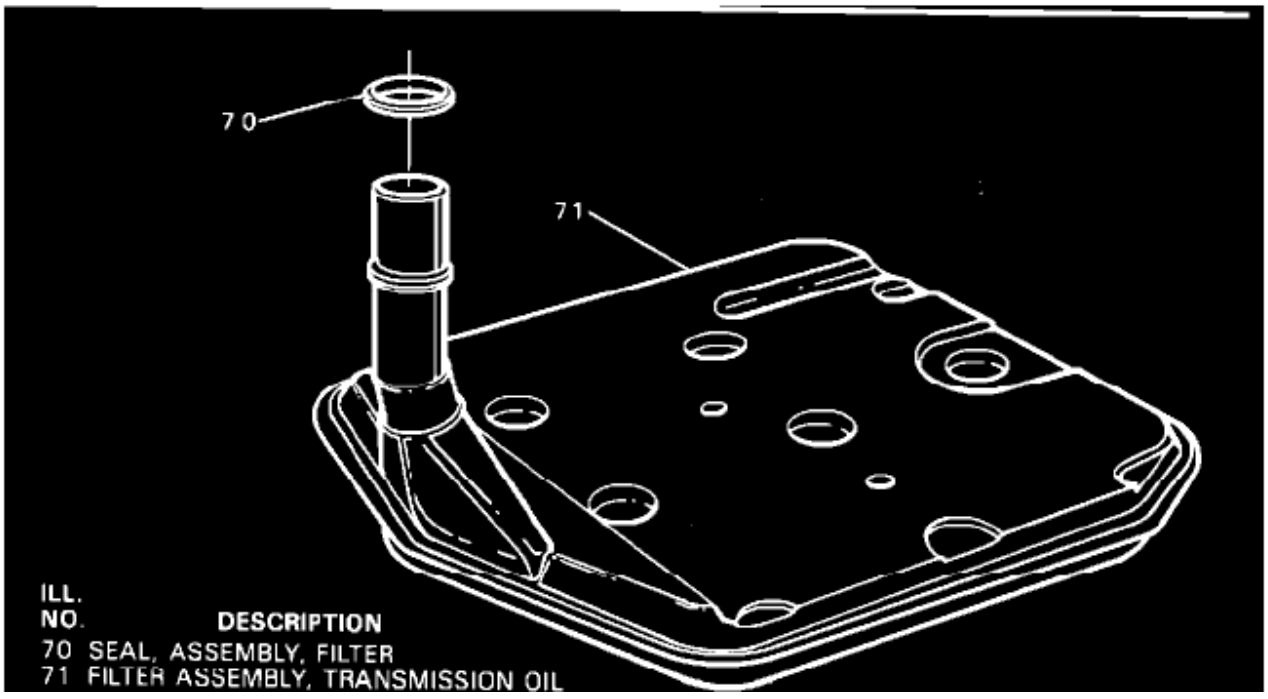
SUBJECT: SPARK KNOCK (PREIGNITION)

MODELS: 1984-85 C, K, G TRUCKS EQUIPPED WITH THE LE9 5.0L, LF3 5.0L, OR LS9 5.7L ENGINE AND ELECTRIC SPARK CONTROL (ESC) FEDERAL EMISSIONS AND ELECTRONIC SPARK TIMING (EST) CALIFORNIA EMISSIONS.

THIS BULLETIN CANCELS AND SUPERSEDES 86-B-21 (DECEMBER, 1985) ALL COPIES OF WHICH SHOULD BE DESTROYED.

Some 1984-85 vehicles equipped with the LE9 5.0L (VIN Code H), LF3 5.0L (VIN Code F), or LS9 5.7L (VIN Code L) engine may experience detonation (preignition) or poor performance when operating in a loaded condition or pulling a grade. As a result of the preignition, the ESC (Federal) or EST (California) retards the spark timing, and a noticeable reduction in performance may occur. In the event the preignition condition is not corrected by the ESC/EST spark retard, continued operation under these conditions could result in internal engine damage. To reduce the possibility of this occurrence, the spark plugs should be changed to a colder heat range. When these conditions exist, the original equipment (R44TS) spark plugs should be replaced with R43CTS (P/N 5613810). The correct spark plug gap is .045". Starting with 1986 vehicles, the LE9, LF3, LS9, and LT9 engines are built with the R43CTS spark plugs.





Fluid Filter - A/T: Technical Service Bulletins A/T - Updated Filter and Seal

GMC NUMBER: 88-T-53

GROUP: 7A - Automatic Transmission

DATE: November, 1987

CORPORATE NUMBER:

867107

SUBJECT: SERVICE AND PARTS INFORMATION ON A NEW TRANSMISSION FLUID FILTER AND FILTER SEAL

MODELS: 1982 - 1987 LIGHT DUTY MODELS AND 1988 C/K TRUCKS EQUIPPED WITH THM 700-R4 AUTOMATIC TRANSMISSIONS

BULLETIN COVERS:

A new design THM 700-R4 transmission fluid filter and filter seal. The new design transmission filter is a wider filter that has a felt element in place of the screen element and a shorter filter neck. The filter also has a molded body that locates over the valve body bolts, thus eliminating the need for the filter retainer clip. The new design filter seal is a wider compression type seal that fits snug in its bore.

FIGURE 1 - THM 700-R4 TRANSMISSION IDENTIFICATION INFORMATION

FIGURE 2 - OIL FILTER ASSEMBLY

DATE OF PRODUCTION CHANGE: (Figure No. 1)

Beginning July 6, 1987 (Julian date 187) all 1987 THM 700-R4 transmissions were produced with the new design transmission filter (71) and filter seal

(70), Figure No. 2. SERVICE ACTION:

When servicing any 1982 through 1987 THM 700-R4 transmission (built prior to Julian date 187), use the previous design transmission filter and seal until current service stock is depleted. When using the new design filter and seal on any 1982 through 1987 THM 700-R4 transmission (built prior to Julian date 187), the filter retaining clip (reference parts book Illustration No. 87) is not needed and should be discarded. NOTICE:

Care should be taken when installing the new design filter and filter seal. The filter seal is a compression type seal and will fit snug in its bore. Damage to the filter neck could result if the filter is installed incorrectly.

To correctly install the filter and seal, coat the seal with petroleum jelly or Automatic Transmission Fluid and with the seal over the filter neck, insert the filter into its bore in the pump assembly. With the palm of your hand gently push on the filter until it seats.

SERVICE PARTS INFORMATION:

PART NO. DESCRIPTION

8657926 Package - Filter, Filter Seal

and Gasket

8657767 Seal - Filter Neck (Available

Separately)

LABOR OPERATION:

K6500 Pan and/or gasket, transmission oil replace .6 hr for C/K, R/V, S/T, M .8 hr for G

Fuel Pressure Release: Service and Repair

Throttle Body Injected Engines

1. Remove fuel pump fuse from fuse box. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and replace fuel pump fuse.

Port Injected Engines

1. Disconnect fuel tank harness connector. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and reconnect fuel tank harness connector.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Oil Filter: Technical Service Bulletins Engine - Noise/Damage Oil Filter Application Importance

INFORMATION

Bulletin No.: 07-06-01-016B

Date: July 27, 2009

Subject: Information on Internal Engine Noise or Damage After Oil Filter Replacement

Models:

2010 and Prior Passenger Cars and Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X

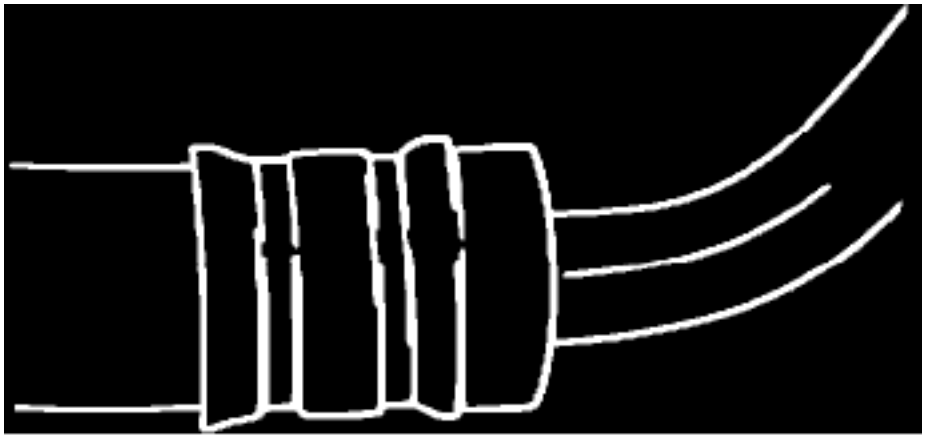
Supercede: This bulletin is being updated to add model years. Please discard Corporate Bulletin Number 07-06-01-016A (Section 06 - Engine/Propulsion System).

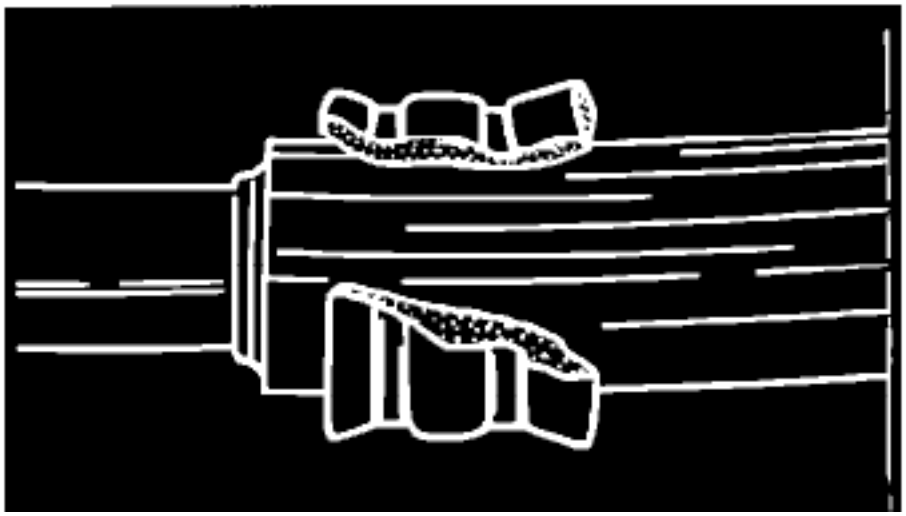
Important Engine damage that is the result of an incorrect or improperly installed engine oil filter is not a warrantable claim. The best way to avoid oil filter quality concerns is to purchase ACDelco(R) oil filters directly from GMSPO.

Oil filter misapplication may cause abnormal engine noise or internal damage. Always utilize the most recent parts information to ensure the correct part number filter is installed when replacing oil filters. Do not rely on physical dimensions alone. Counterfeit copies of name brand parts have been discovered in some aftermarket parts systems. Always ensure the parts you install are from a trusted source. Improper oil filter installation may result in catastrophic engine damage.

Refer to the appropriate Service Information (SI) installation instructions when replacing any oil filter and pay particular attention to procedures for proper cartridge filter element alignment. If the diagnostics in SI (Engine Mechanical) lead to the oil filter as the cause of the internal engine noise or damage, dealers should submit a field product report. Refer to Corporate Bulletin Number 02-00-89-002I (Information for Dealers on How to Submit a Field Product Report).

Disclaimer





Hose/Line HVAC: Customer Interest A/C - Refrigerant Hose & Clamp Repairs

85-40 1B (Ia) FEB., 1985 Subject:

A/C REFRIGERANT HOSE AND CLAMP REPAIRS

Model and Year: ALL CHEVROLET VEHICLES

TO: ALL CHEVROLET DEALERS

WARRANTY AND NON-WARRANTY REPAIRS

When a freon leak is detected at an air conditioning refrigerant hose connection which has a crimped metal band, the crimped band may be replaced with a special screw-type service clamp for non-warranty type repairs according to the following clamp replacement procedure. Also included is a hose repair procedure for a damaged and/or leaking refrigerant hose. This allows the dealer the added flexibility of repairing hose assemblies rather than replacing them.

Warranty repairs should continue the replacement procedure.

NOTICE: Hoses marked with the words "PARKER", "PARKER PARFLEX 80" or "PARFLEX 80" are nylon and cannot be repaired by these procedures. These hoses should be replaced as entire assemblies.

Figure 1

CLAMP REPLACEMENT

1. Completely discharge the air conditioning system by an approved method.

2. Disconnect the entire hose assembly and remove it from the vehicle. Put tape or approved plastic caps over all of the openings to the system, including the removed hose assembly, to prevent dirt and moisture contamination.

3. Using a fine tooth hacksaw, cut a wide notch all the way across the crimped metal band (see Figure 1).

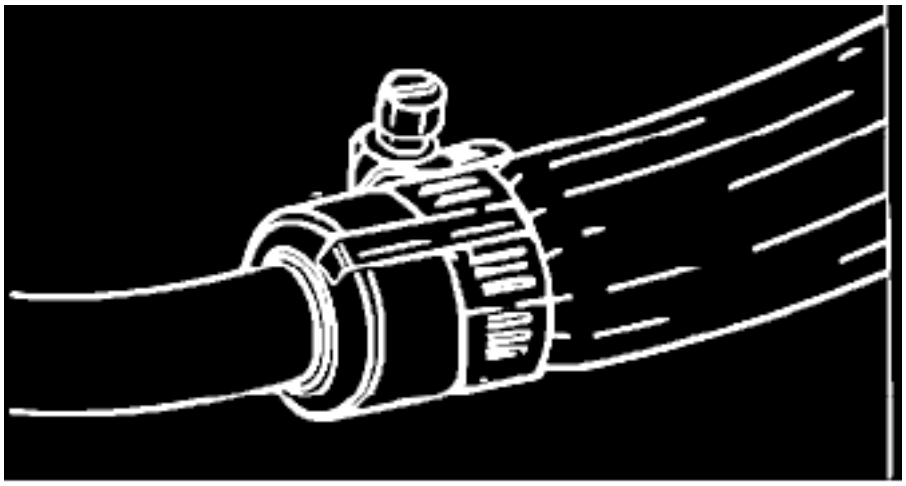
NOTICE: AVOID CUTTING THE HOSE MATERIAL.

FIGURE 2

4. Using a cold chisel and a small hammer, tap carefully at the notch until the band is split all the way across (see Figure 2).

5. Pry the band open until it can be removed without cutting the hose material with the burred edges.

NOTICE: If the hose material has been cut, all or part of the hose must be replaced. See Table A for applicable clamps, hose material, and splicer fitting kits. The repaired hose should be the same overall length as the original.



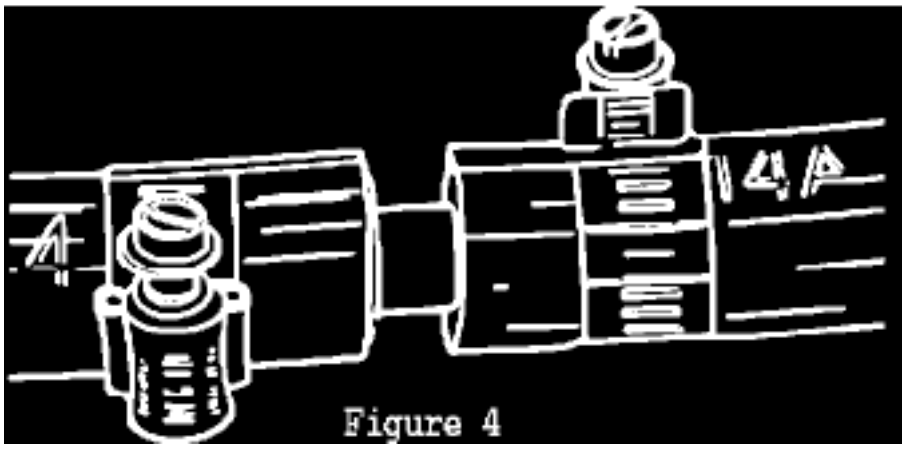


FIGURE 3

6. Install the special screw-type service clamp so that the locator lug is positioned on the hose end (see Figure 3). Tighten clamp to 4.5 N-m (40 in. lbs.).

7. Reinstall the hose assembly on the vehicle with new 'O' rings where used. A/C compressor oil should be used to lubricate the 'O' rings.

8. Partially charge the system and perform a leak test before completely recharging.

FIGURE 4

HOSE REPAIR

1. Perform Step #1 of the Clamp Replacement Procedure.

2. Using a fine tooth hacksaw, cut all the way through the metal band clamp and into the top layer of the hose on one end of the hose if only part of it is being replaced or on both ends if the entire hose is being replaced.

3. Pry the band open until it can be removed without damaging the fitting.

4. If only part of the hose is being replaced:

a. Cut the bad part away squarely.

b. Use a new section of the hose of the same inside diameter and cut it 13 mm (1/2") shorter than the removed section (see Table A for parts applications).

c. Install the proper size splicer fitting kit per the instructions, between the remaining section and new section of hose and install the other end of the hose on the fitting. Align fittings so that there will be no twist in the hose when it is on the vehicle (see Figure 4). See Table A for parts applications.

d. Install two service clamps at a splice and one at a fitting as in Step #6 of the Clamp Replacement Procedure.

e. Perform Steps #7 and #8 of the Claim Replacement procedure.

5. If the entire section of hose is being replaced:

a. Cut the old hose off of both fittings.

b. Install a new section of hose of the same inside diameter and cut to the same length and install it on fittings. Align fittings so that there will be no twist in the hose when it is on the vehicle. See Table A for parts applications.

c. Install a service clamp at each end as in Step #6 of the Clamp Replacement Procedure.

d. Perform Steps #7 and #8 of the Clamp Replacement Procedure. TABLE A

MATERIAL AND SPLICER FITTING KITS

Hose Roll

Group # Part # Description I.D. Length

9.242/ (Hose O.D. 11/16"-

1.166 3909030 A/C Hose Clamp 1-7/32")

8.962 230882 A/C Refrigerant Hose 5/16" 15'

8.962 230883* A/C Refrigerant Hose 13/32" 15'

8.962 12309273* A/C Refrigerant Hose 13/32" 15'

8.962 12309274 A/C Refrigerant Hose 13/32" 50'

8.962 230884 A/C Refrigerant Hose 1/2" 15'

8.962 12309271* A/C Refrigerant Hose 1/2" 15'

8.962 12309272 A/C Refrigerant Hose 1/2" 50'

8.962 12309275 A/C Refrigerant Hose 5/8" 15'

8.962 12309276 A/C Refrigerant Hose 5/8" 50'

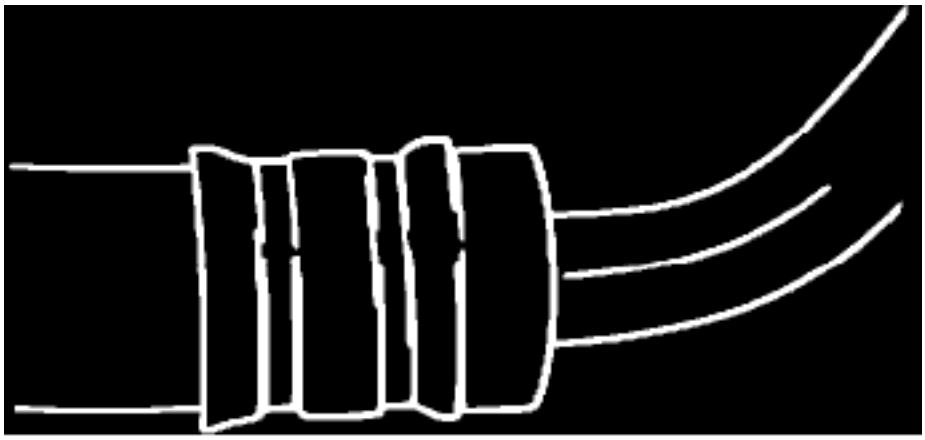
9.222 3023686 Splicer Fitting Kit 5/16"

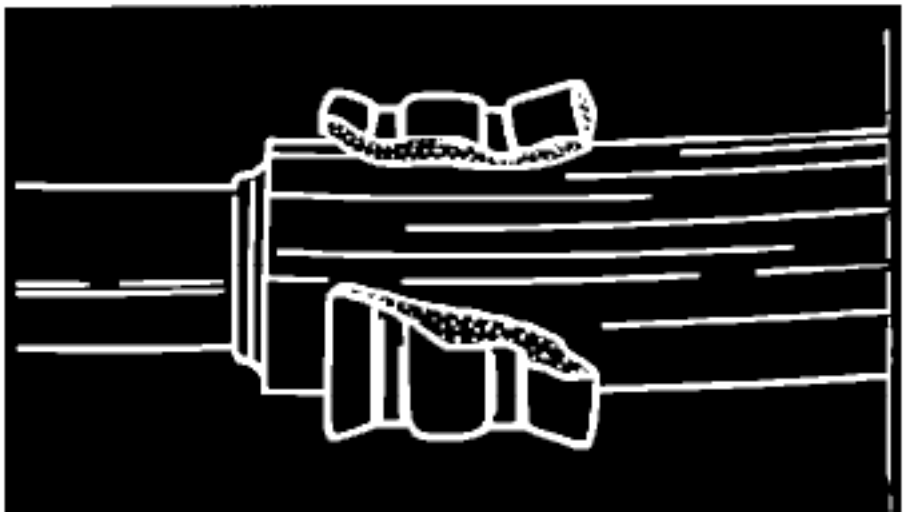
9.222 3023687 Splicer Fitting Kit 13/32"

9.222 3023688 Splicer Fitting Kit 1/2"

9.222 3023689 Splicer Fitting Kit 5/8"

* Hoses in this list which are of the same inside diameter and roll length are interchangeable. Different part numbers denote different manufacturer sources in these cases.





Hose/Line HVAC: All Technical Service Bulletins A/C - Refrigerant Hose & Clamp Repairs

85-40 1B (Ia) FEB., 1985 Subject:

A/C REFRIGERANT HOSE AND CLAMP REPAIRS

Model and Year: ALL CHEVROLET VEHICLES

TO: ALL CHEVROLET DEALERS

WARRANTY AND NON-WARRANTY REPAIRS

When a freon leak is detected at an air conditioning refrigerant hose connection which has a crimped metal band, the crimped band may be replaced with a special screw-type service clamp for non-warranty type repairs according to the following clamp replacement procedure. Also included is a hose repair procedure for a damaged and/or leaking refrigerant hose. This allows the dealer the added flexibility of repairing hose assemblies rather than replacing them.

Warranty repairs should continue the replacement procedure.

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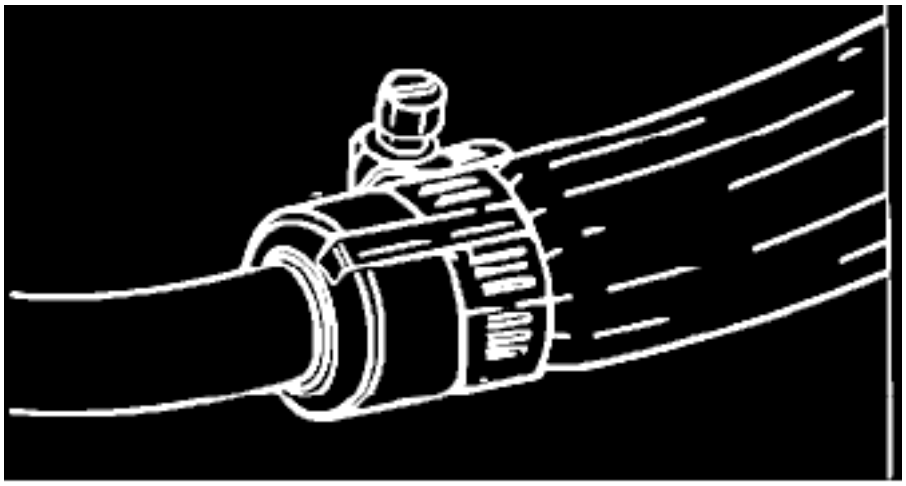
FIGURE 2

4. Using a cold chisel and a small hammer, tap carefully at the notch until the band is split all the way across (see Figure 2).

5. Pry the band open until it can be removed without cutting the hose material with the burred edges.

NOTICE: If the hose material has been cut, all or part of the hose must be replaced. See Table A for applicable clamps, hose material, and splicer fitting kits. The repaired hose should be the same overall length as the original.



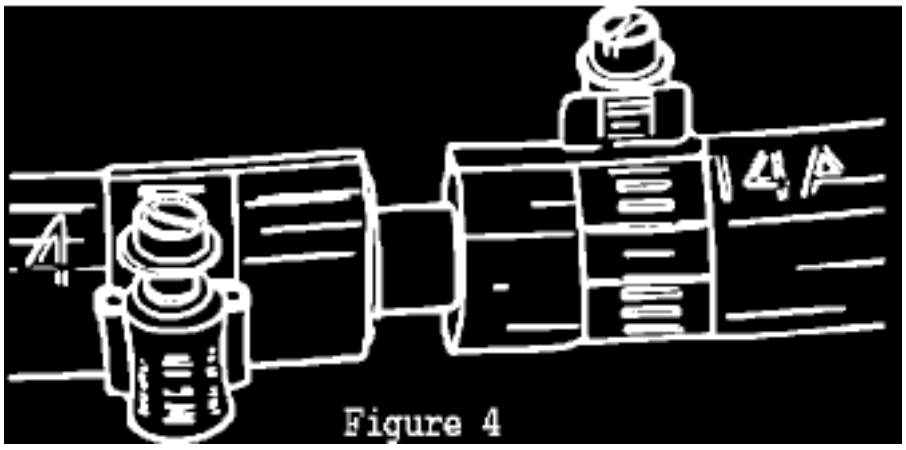


FIGURE 3

6. Install the special screw-type service clamp so that the locator lug is positioned on the hose end (see Figure 3). Tighten clamp to 4.5 N-m (40 in. lbs.).

7. Reinstall the hose assembly on the vehicle with new 'O' rings where used. A/C compressor oil should be used to lubricate the 'O' rings.

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3. Pry the band open until it can be removed without damaging the fitting.

4. If only part of the hose is being replaced:

a. Cut the bad part away squarely.

b. Use a new section of the hose of the same inside diameter and cut it 13 mm (1/2") shorter than the removed section (see Table A for parts applications).

c. Install the proper size splicer fitting kit per the instructions, between the remaining section and new section of hose and install the other end of the hose on the fitting. Align fittings so that there will be no twist in the hose when it is on the vehicle (see Figure 4). See Table A for parts applications.

d. Install two service clamps at a splice and one at a fitting as in Step #6 of the Clamp Replacement Procedure.

e. Perform Steps #7 and #8 of the Claim Replacement procedure.

5. If the entire section of hose is being replaced:

a. Cut the old hose off of both fittings.

b. Install a new section of hose of the same inside diameter and cut to the same length and install it on fittings. Align fittings so that there will be no twist in the hose when it is on the vehicle. See Table A for parts applications.

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* Hoses in this list which are of the same inside diameter and roll length are interchangeable. Different part numbers denote different manufacturer sources in these cases.

Hose/Line HVAC: Service and Repair

1. Discharge system refrigerant.

2. Disconnect hose pipe assembly at accumulator outlet, condenser inlet and compressor head.

3. Remove mounting straps and remove assembly from vehicle.

4. Reverse procedure to install.

Power Steering Line/Hose: Technical Service Bulletins P/S - Rack & Pinion O-Ring Seal Fitting Leaks

85-61 3B (IX)

APR., 1985 Subject:

POWER STEERING HOSE LINE CONNECTION FITTING LEAKS

Model and Year: ALL VEHICLES WITH POWER STEERING EXCEPT NOVA, SPRINT AND SPECTRUM

TO: ALL CHEVROLET DEALERS

"O" ring type seal fittings have been used on rack and pinion and integral gear power steering hose line connections since 1980.

Fitting torque specification is 27 N-m (20 lbs. ft.). If a leak is experienced at the fitting area when properly tightened, this condition may be caused by a damaged fitting "O" ring. Inspect the "O" ring for damage, pipe end for cracks, fitting threads for damage and replace as required.

DO NOT EXCEED fitting torque specification. Additional torque will not increase "O" ring sealing ability and may result in cracking the connection boss on aluminum gear housings. If a leak is experienced at the connection area with a new undamaged "O" ring under correct torque, inspect housing boss for possible porosity. A porosity condition will require housing or short gear replacement.

Clutch Fluid: Capacity Specifications

Fill the clutch master cylinder to the "Full" or "MAX" mark on the reservoir. Do not overfill.

Caution: Should accidental spillage occur, rinse the area thoroughly with water. Pay special attention to any electrical wires, parts, harnesses, rubber or painted surfaces.

Clutch Fluid: Fluid Type Specifications

Hydraulic Clutch Fluid	.....
DOT 3 or DOT 4 Brake Fluid	

Table 1 — Approved and Licensed Providers of DEX-COOL Products Meeting General Motors GM6277M Specifications

License #	Provider
DC 001	Chevron
DC 002	Prestone
DC 003	Shell
DC 004	Valvoline
DC 005	Recycled Fluid Technologies (Bulk Service)
DC 011	GM Vehicle Care
DC 011	AC Delco

Coolant: Technical Service Bulletins Cooling System - Coolant Recycling Information

Bulletin No.: 00-06-02-006D

Date: August 15, 2006

INFORMATION

Subject: Engine Coolant Recycling and Warranty Information

Models: 2007 and Prior GM Passenger Cars and Trucks (Including Saturn) 2007 and Prior HUMMER Vehicles 2005-2007 Saab 9-7X

Attention:

Please address this bulletin to the Warranty Claims Administrator and the Service Manager.

Supercede:

This bulletin is being revised to adjust the title and Include Warranty Information. Please discard Corporate Bulletin Number 00-06-02-006C (Section 06 - Engine/Propulsion System).

Coolant Reimbursement Policy

General Motors supports the use of recycled engine coolant for warranty repairs/service, providing a GM approved engine coolant recycling system is used. Recycled coolant will be reimbursed at the GMSPO dealer price for new coolant plus the appropriate mark-up. When coolant replacement is required during a warranty repair, it is crucial that only the relative amount of engine coolant concentrate be charged, not the total diluted volume. In other words: if you are using two gallons of pre-diluted (50:50) recycled engine coolant to service a vehicle, you may request reimbursement for one gallon of GM Goodwrench engine coolant concentrate at the dealer price plus the appropriate warranty parts handling allowance.

Licensed Approved DEX-COOL(R) Providers

Important:

USE OF NON-APPROVED VIRGIN OR RECYCLED DEX-COOL(R) OR DEVIATIONS IN THE FORM OF ALTERNATE CHEMICALS OR ALTERATION OF EQUIPMENT, WILL VOID THE GM ENDORSEMENT, MAY DEGRADE COOLANT SYSTEM INTEGRITY AND PLACE THE COOLING SYSTEM WARRANTY UNDER JEOPARDY.

Shown in Table 1 are the only current licensed and approved providers of DEX-COOL(R). Products that are advertised as "COMPATIBLE" or "RECOMMENDED" for use with DEX-COOL(R) have not been tested or approved by General Motors. Non-approved coolants may degrade the

Table 2 — Approved Engine Coolant Recycling Services – DEX-COOL®

Recycler	Equipment/Service	Recycled Products	Demographics	Contact
Recycling Fluid Technologies	Service	DEX-COOL® Licensed Provider (50/50 pre-mix)	IN, IL, MI, OH	800-474-4947

coolant system integrity and will no longer be considered a 5 yr/150,000 mile (240,000 km) coolant.

Coolant Removal Services/Recycling

The tables include all coolant recycling processes currently approved by GM. Also included is a primary phone number and demographic information. Used DEX-COOL(R) can be combined with used conventional coolant (green) for recycling. Depending on the recycling service and/or equipment, it is then designated as a conventional 2 yr/30,000 mile (50,000 km) coolant or DEX-COOL(R) 5 yr/150,000 mile (240,000 km) coolant. Recycled coolants as designated in this bulletin may be used during the vehicle(s) warranty period.

DEX-COOL(R) Recycling

The DEX-COOL(R) recycling service listed in Table 2 has been approved for recycling waste engine coolants (DEX-COOL) or conventional) to DEX-COOL(R) with 5 yr/150,000 mile (240,000 km) usability. Recycling Fluid Technologies is the only licensed provider of Recycled DEX-COOL(R) meeting GM6277M specifications and utilizes GM approved inhibitor packages. This is currently a limited program being monitored by GM Service Operations which will be expanded as demand increases.

Conventional (Green) Recycling

Table 3 — Approved Engine Coolant Recycling Services and Equipment – Conventional Green

Recycler	Equipment/Service	Recycled Products	Demographics	Contact
Antifreeze Technologies Systems	Service	Conventional Green (50/50 pre-mix)	IL, IN, MA, MD, MI, NH, NJ, PA, TX, VA	800-474-4947
Asbury Environmental Services/Demenno Kerdoon - Trinity Brand	Service	Conventional Green (50/50 pre-mix)	AZ, CA, NV, OR, WA	800-974-4495
Automotive Environmental Service	Service	Conventional Green (50/50 pre-mix)	AZ, CA, NV, OR, WA	650-325-2666
Kleentek	AF-250	Conventional Green (50/50 pre-mix)	US, Canada, Mexico	800-435-5336
Wynn Oil Company	Du-All Bulk 07400	Conventional Green (50/50 pre-mix)	US, Canada, Mexico	800-GMTools 800-989-8363
Clore Automotive	TechGuard	Conventional Green (50/50 pre-mix)	US, Canada, Mexico	800-328-2921

Processes shown in the Table 3 are capable of recycling waste engine coolants (DEX-COOL(R) or conventional) to a conventional (green) coolant. Recycling conventional coolant can be accomplished at your facility by a technician using approved EQUIPMENT (listed by model number in Table 3), or by an approved coolant recycling SERVICE which may recycle the coolant at your facility or at an offsite operation. Refer to the table for GM approved coolant recyclers in either of these two categories. Should you decide to recycle the coolant yourself, strict adherence to the operating procedures is imperative. Use ONLY the inhibitor chemicals supplied by the respective (GM approved) recycling equipment manufacturer.

Sealing Tablets

Cooling System Sealing Tablets (Seal Tabs) should not be used as a regular maintenance item after servicing an engine cooling system. Discoloration of coolant can occur if too many seal tabs have been inserted into the cooling system. This can occur if seal tabs are repeatedly used over the service life of a vehicle. Where appropriate, seal tabs may be used if diagnostics fail to repair a

small leak in the cooling system. When a condition appears in which seal tabs may be recommended, a specific bulletin will be released describing their proper usage.

Water Quality

The integrity of the coolant is dependent upon the quality of DEX-COOL(R) and water. DEX-COOL(R) is a product that has enhanced protection capability as well as an extended service interval. These enhanced properties may be jeopardized by combining DEX-COOL(R) with poor quality water. If you suspect the water in your area of being poor quality, it is recommended you use distilled or de-ionized water with DEX-COOL(R).

"Pink" DEX-COOL(R)

DEX-COOL(R) is orange in color to distinguish it from other coolants. Due to inconsistencies in the mixing of the dyes used with DEX-COOL(R), some batches may appear pink after time. The color shift from orange to pink does not affect the integrity of the coolant, and still maintains the 5 yr/150,000 mile (240,000 km) service interval.

Back Service

Only use DEX-COOL(R) if the vehicle was originally equipped with DEX-COOL(R).

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Contamination

Mixing conventional green coolant with DEX-COOL(R) will degrade the service interval from 5 yrs./150,000 miles (240,000 km) to 2 yrs./30,000 miles (50,000 km) if left in the contaminated condition. If contamination occurs, the cooling system must be flushed twice immediately and re-filled with a 50/50 mixture of DEX-COOL(R) and clean water in order to preserve the enhanced properties and extended service interval of DEX-COOL(R).

After 5 years/150,000 miles (240,000 km)

After 5 yrs/150,000 miles (240,000 km), the coolant should be changed, preferably using a coolant exchanger. If the vehicle was originally equipped with DEX-COOL(R) and has not had problems with contamination from non-DEX-COOL(R) coolants, then the service interval remains the same, and the coolant does not need to be changed for another 5 yrs/150,000 miles (240,000 km)

Equipment (Coolant Exchangers)

The preferred method of performing coolant replacement is to use a coolant exchanger. A coolant exchanger can replace virtually all of the old coolant with new coolant. Coolant exchangers can be used to perform coolant replacement without spillage, and facilitate easy waste collection. They can also be used to lower the coolant level in a vehicle to allow for less messy servicing of cooling system components. It is recommended that you use a coolant exchanger with a vacuum feature facilitates removing trapped air from the cooling system. This is a substantial time savings over repeatedly thermo cycling the vehicle and topping-off the radiator. The vacuum feature also allows venting of a hot system to relieve system pressure. Approved coolant exchangers are available through the GMDE (General Motors Dealer Equipment) program.

For refilling a cooling system that has been partially or fully drained for repairs other than coolant replacement, the Vac-N-Fill Coolant Refill Tool (GE-47716) is recommended to facilitate removal of trapped air from the cooling system during refill.

Disclaimer

Coolant: Technical Service Bulletins Coolant - Used Anti-Freeze Policy

Number: 91-09-0A

Section: OA

Date: April 1990

Corporate Bulletin No.: 976202 Subject:

INFORMATION REGARDING RECONSTITUTED ANTI-FREEZE COOLANT TESTING AND THE USE OF A REFRACTOMETER

Model and Year: ALL MODELS AND YEARS

TO: ALL CHEVROLET DEALERS

RECONSTITUTED ANTIFREEZE

At present, three types of recycling systems are available:

1) chemical addition to coolant;

2) filtration and addition of supplemental additives; and

3) separation of pure glycol from used coolant and reinhibition.

1) Chemical Addition-NOT RECOMMENDED

With chemical addition, chemicals are added to the used engine coolant in an attempt to "clean up" the coolant. This system is the easiest since the only work involved is the addition of chemicals to the radiator. Most of these types of recycling systems use a strong acid to change precipitated corrosion products into a more soluble form. However, in addition to dissolving the corrosion products, the strong acid also attacks and corrodes the metals of the cooling system.

2) Filtration and Addition of Supplemental Additives-NOT RECOMMENDED

In this type of system, the used coolant is either taken out of the vehicle or a flush-type unit is connected to the cooling system.

The current technology consists simply of filtration and reinhibition of the spent coolant. While this does remove suspended solids, filtration does nothing to remove harmful degradation and corrosion products that are soluble in glycol solution. The reinhibition step used in current recycling systems may fail to produce a coolant which adequately protects all metals including aluminum in the most critical heat transfer applications, such as occurs in the cylinder heads and blocks. 3)

Separation of Pure Glycol and InhibitionThe separation of pure glycol and the addition of fresh inhibitors is the ideal method for recycling coolants. Unfortunately, this method is expensive from both a collection standpoint and the technology available to economically extract pure ethylene glycol from used coolant.

At this time, General Motors does not endorse these practices or equipment.

Due to a worldwide shortage of ethylene glycol in 1988, some coolant manufacturers have started to mix other types of glycol in their coolant formulations; propylene glycol is the most common new ingredient. A hydrometer will not provide a correct measurement of freeze protection when anything other than ethylene glycol and water is being tested. The degree of inaccuracy will vary depending on the proportion of other glycols present in the coolant.

Hydrometers test the amount of glycol in a mixture by measuring the specific gravity of the mixture; the more ethylene glycol, the higher the float balls go, and the better the freeze protection. Because ethylene glycol and propylene glycol do not have the same specific gravities, hydrometer readings of mixtures containing propylene glycol give incorrect values.

As the shortage of ethylene glycol continues and/or worsens, more and more variations in antifreeze formulas will be marketed. It is, therefore, recommended that you purchase a "refractometer" and encourage your technicians to use it. Refractometers test for the amount of glycol in a coolant mixture by measuring the speed of light as it passes through the fluid and are not affected by the specific gravity of the glycol. The freeze protection of solutions of ethylene glycol in water, solutions of propylene glycol in water, and solutions of mixtures of propylene glycol and ethylene glycol in water may all be tested with sufficient accuracy using a refractometer.

The following refractometers are available from Kent Moore:

J 23688 Farenheit scale, measures to -50 F

J 26568 Centigrade scale, measures to -45.5 C

J 38633 Farenheit scale, measures to -84 F (For extreme cold weather regions)

The toll free number for Kent Moore is 1-800-345-2233.

Portions of this article were reprinted with permission, from Dow Chemical Canada, Inc., P.O. Box 1012, Sarnia, Ontario N7T 7K7.

Coolant: Technical Service Bulletins Warranty - Recycled Engine Coolant Policy

Group Ref.: Warranty Administration Bulletin No.: 310504 Date: February, 1994

WARRANTY ADMINISTRATION

SUBJECT: RECYCLED ENGINE COOLANT POLICY

MODELS: 1994 AND PRIOR PASSENGER CARS AND TRUCKS

ATTENTION: WARRANTY CLAIMS ADMINISTRATOR AND SERVICE MANAGER

General Motors supports the use of recycled engine coolant for warranty repairs/service, providing a GM approved engine coolant recycling system is used. For detailed information on GM approved engine coolant recycling equipment guidelines refer to the following bulletins: Cadillac 93-1-18, GMC Truck 93-6B-34, Chevrolet 93-73-6B, Pontiac 93-6-18, Oldsmobile 1-93-43, Buick 93-6B-1 (Corporate Number 236203).

Recycled coolant will be reimbursed at the GMSPO dealer price for new coolant plus the appropriate mark-up. When coolant replacement is required during a warranty repair, it is crucial to assure that only the relative amount of engine coolant concentrate be charged, not the total diluted volume. In other words, if you are using two gallons of pre-diluted (50:50) recycled engine coolant to service a vehicle, you may request reimbursement for one gallon of Goodwrench engine coolant concentrate at the dealer price plus the appropriate warranty parts handling allowance.

Coolant: Technical Service Bulletins Coolant - Information on Propylene Glycol Usage

File In Section: 6 - Engine

Bulletin No.: 43-62-01B

Date: April, 1995

Subject: Propylene Glycol Engine Coolant

Models: 1994 and Prior Passenger Cars and Trucks

This bulletin is being revised to reflect most current information on propylene glycol engine coolant. Please discard Corporate Bulletin Number 4362O1A (Group Reference 6 - Engine).

General Motors has been reviewing data supplied on the performance of propylene glycol engine coolant in GM vehicles. It is our conclusion that propylene glycol engine coolant will perform adequately under most vehicle operating conditions. As a result, propylene glycol engine coolant (meeting performance specification GM 1825M) may be used in GM vehicles and will not affect the warranty coverage.

Prior to adding propylene glycol engine coolant to the cooling system, all the existing (ethylene glycol) coolant must be removed. This can be accomplished either by utilizing water-based coolant flushing equipment or "waterless quick change" equipment available in the GMDE program. As with any coolant change procedure, be sure to thoroughly purge the heater core and block as well as the radiator before attempting to convert the system to propylene glycol coolant.

Freeze/Boil point levels are different for propylene glycol than for ethylene glycol engine coolant. To accurately determine freeze/boil protection level, it is imperative that coolants not be mixed. Removing all the used coolant as previously discussed resolves this concern. Freeze protection of propylene glycol cannot be determined using a standard hydrometer. Rather, a refractometer or test strip must be used.

Propylene glycol engine coolants may be recycled in the same manner as conventional ethylene glycol coolant. No adverse effects will be encountered if these coolants are mixed prior to recycling, however, the ratio of propylene glycol coolant to ethylene glycol coolant should be kept low to minimize the effects on freeze point measurements.

Coolant: Technical Service Bulletins Cooling System - Reconstituted Anti-Freeze Information

Number: 90-49-6B

Section: 6B

Date: August 1989

Corporate Bulletin No.: 930107

Subject: RECONSTITUTED ANTI-FREEZE

Model and Year: ALL MODELS, ALL MODEL YEARS

TO: ALL CHEVROLET DEALERS

This bulletin provides information on "reconstituted anti-freeze".

It has been brought to our attention that a number of manufacturers claim to have the capability of reconstituting engine coolant on site. At this time, General Motors does not endorse this practice or any equipment.

Anti-freeze recycling is a very complex issue. In use as an engine coolant, ethylene glycol becomes oxidized producing a very degraded and deteriorated substance. Contamination by other automotive fluids during draining, handling and storage is also a major detriment to the reclaiming process. There is no additive we are aware of that can be merely put into used coolant that will restore it to an acceptable state.

Typically, a multi-million dollar facility, utilizing sophisticated technology with distillation capabilities along with appropriate quality control would be required to adequately process used coolant to bring it to GM specifications.

Disposal of all chemical products should be done in accordance with all applicable federal, state and local laws and regulations.

Review engine coolant substitutes Dealer Service Bulletin No. 89-57-6B, dated January 1989.

Coolant: Specifications

Less A/C System Capacity 16.8 qt (US)

With A/C System Capacity 17.2 qt (US)

Fluid - A/T: Technical Service Bulletins A/T - DEXRON(R)-VI Fluid Information

INFORMATION

Bulletin No.: 04-07-30-037E

Date: April 07, 2011

Subject: Release of DEXRON(R)-VI Automatic Transmission Fluid (ATF)

Models:

2008 and Prior GM Passenger Cars and Light Duty Trucks 2003-2008 HUMMER H2 2006-2008 HUMMER H3 2005-2007 Saturn Relay 2005 and Prior Saturn L-Series 2005-2007 Saturn ION 2005-2008 Saturn VUE with 4T45-E 2005-2008 Saab 9-7X Except 2008 and Prior Chevrolet Aveo, Equinox Except 2006 and Prior Chevrolet Epica Except 2007 and Prior Chevrolet Optra Except 2008 and Prior Pontiac Torrent, Vibe, Wave Except 2003-2005 Saturn ION with CVT or AF23 Only Except 1991-2002 Saturn S-Series Except 2008 and Prior Saturn VUE with CVT, AF33 or 5AT (MJ7/MJ8) Transmission Only Except 2008 Saturn Astra

Attention:

DEXRON(R)-VI Automatic Transmission Fluid (ATF) is the only approved fluid for warranty repairs for General Motors transmissions/transaxles requiring DEXRON(R)-III and/or prior DEXRON(R) transmission fluids.

Supercede: This bulletin is being revised to update information. Please discard Corporate Bulletin Number 04-07-30-037D (Section 07 - Transmission/Transaxle).

MANUAL TRANSMISSIONS / TRANSFER CASES and POWER STEERING

The content of this bulletin does not apply to manual transmissions or transfer cases. Any vehicle that previously required DEXRON(R)-III for a manual transmission or transfer case should now use P/N 88861800. This fluid is labeled Manual Transmission and Transfer Case Fluid. Some manual transmissions and transfer cases require a different fluid. Appropriate references should be checked when servicing any of these components.

Power Steering Systems should now use P/N 9985010 labeled Power Steering Fluid.

Consult the Parts Catalog, Owner's Manual, or Service Information (SI) for fluid recommendations.

Some of our customers and/or General Motors dealerships/Saturn Retailers may have some concerns with DEXRON(R)-VI and DEXRON(R)-III Automatic Transmission Fluid (ATF) and transmission warranty claims. DEXRON(R)-VI is the only approved fluid for warranty repairs for General Motors transmissions/transaxles requiring DEXRON(R)-III and/or prior DEXRON(R) transmission fluids (except as noted above). Please remember that the clean oil reservoirs of the J-45096 - Flushing and Flow Tester machine should be purged of DEXRON(R)-III and filled with DEXRON(R)-VI for testing, flushing or filling General Motors transmissions/transaxles (except as noted above).

DEXRON(R)-VI can be used in any proportion in past model vehicles equipped with an automatic transmission/transaxle in place of DEXRON(R)-III (i.e. topping off the fluid in the event of a repair or fluid change). DEXRON(R)-VI is also compatible with any former version of DEXRON(R) for use in automatic transmissions/transaxles.

DEXRON(R)-VI ATF

General Motors Powertrain has upgraded to DEXRON(R)-VI ATF with the start of 2006 vehicle production.

Current and prior automatic transmission models that had used DEXRON(R)-III must now only use DEXRON(R)-VI.

DEXRON(R)-VI	
Fluid Service Change Interval	160,000 km (100,000 mi) For Cars and Light Duty Trucks* 80,000 km (50,000 mi) (Severe Use) For Cars and Light Duty Trucks*
Clutch Friction Stability	Improved 100%
Clutch Durability Due To Fluid	Improved 120%
Oil Film Thickness	Increased 20%
Fluid Oxidation	Improved 100%
Foam/Aeration	Improved 150%
Shear Stability	Improved 200%

Part Number	Description
88861003 (US)	DEXRON(R)-VI Auto Trans Fluid (1 qt bottle)
88861045 (US)	DEXRON(R)-VI Auto Trans Fluid (1 gal bottle)
88861046 (US)	DEXRON(R)-VI Auto Trans Fluid (55 gal drum)
19264717 (Canada)	DEXRON(R) VI Auto Trans Fluid (1L bottle)
19264718 (Canada)	DEXRON(R)-VI Auto Trans Fluid (4L bottle)
19264719 (Canada)	DEXRON(R)-VI Auto Trans Fluid (205L drum)

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

All 2006 and future model transmissions that use DEXRON(R)-VI are to be serviced ONLY with DEXRON(R)-VI fluid.

DEXRON(R)-VI is an improvement over DEXRON(R)-III in the following areas:

* These ATF change intervals remain the same as DEXRON(R)-III for the time being.

2006-2008 Transmission Fill and Cooler Flushing

Some new applications of the 6L80 six speed transmission will require the use of the J 45096 - Flushing and Flow Tester to accomplish transmission fluid fill. The clean oil reservoir of the machine should be purged of DEXRON(R)-III and filled with DEXRON(R)-VI.

Parts Information

Disclaimer

Fluid - A/T: Technical Service Bulletins A/T - Water Or Coolant Contamination Information

INFORMATION

Bulletin No.: 08-07-30-035B

Date: November 01, 2010

Subject: Information on Water or Ethylene Glycol in Transmission Fluid

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks with Automatic Transmission

Supercede: This bulletin is being revised to update model years. Please discard Corporate Bulletin Number 08-07-30-035A (Section 07 - Transmission/Transaxle).

Water or ethylene glycol in automatic transmission fluid (ATF) is harmful to internal transmission components and will have a negative effect on reliability and durability of these parts. Water or ethylene glycol in ATF will also change the friction of the clutches, frequently resulting in shudder during engagement or gear changes, especially during torque converter clutch engagement.

Indications of water in the ATF may include:

- ATF blowing out of the transmission vent tube.

- ATF may appear cloudy or, in cases of extreme contamination, have the appearance of a strawberry milkshake.

- Visible water in the oil pan.

- A milky white substance inside the pan area.

- Spacer plate gaskets that appear to be glued to the valve body face or case.

- Spacer plate gaskets that appear to be swollen or wrinkled in areas where they are not compressed.

- Rust on internal transmission iron/steel components.

If water in the ATF has been found and the source of the water entry has not been identified, or if a leaking in-radiator transmission oil cooler is suspected (with no evidence of cross-contamination in the coolant recovery reservoir), a simple and quick test kit is available that detects the presence of ethylene glycol in ATF. The "Gly-Tek" test kit, available from the Nelco Company, should be obtained and the ATF tested to make an accurate decision on the need for radiator replacement. This can help to prevent customer comebacks if the in-radiator transmission oil cooler is leaking and reduce repair expenses by avoiding radiator replacement if the cooler is not leaking. These test kits can be obtained from:

Nelco Company

Test kits can be ordered by phone or through the website listed above. Orders are shipped standard delivery time but can be shipped on a next day delivery basis for an extra charge. One test kit will complete 10 individual fluid sample tests. For vehicles repaired under warranty, the cost of the complete test kit plus shipping charges should be divided by 10 and submitted on the warranty claim as a net item.

The transmission should be repaired or replaced based on the normal cost comparison procedure.

Important If water or coolant is found in the transmission, the following components MUST be replaced.

- Replace all of the rubber-type seals.

- Replace all of the composition-faced clutch plates and/or bands.

- Replace all of the nylon parts.

- Replace the torque converter.

- Thoroughly clean and rebuild the transmission, using new gaskets and oil filter.

Important The following steps must be completed when repairing or replacing.

-

Flush and flow check the transmission oil cooler using J 45096. Refer to Corporate Bulletin Number 02-07-30-052F- Automatic Transmission Oil Cooler Flush and Flow Test Essential Tool J 45096 TransFlow.

- Thoroughly inspect the engine cooling system and hoses and clean/repair as necessary.

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WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer

Fluid - A/T: Technical Service Bulletins Maintenance - Updated Minimum Acceptable Oil Levels

85-54 6 (VI) MAR., 1985 Subject:

MINIMUM ACCEPTABLE OIL LEVELS

Model and Year:ALL PASSENGER AND LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

This cancels and replaces Chevrolet Dealer Service Information Bulletin 83-I-57 which should be destroyed.

The following chart provides a guide for minimum acceptable oil levels "as received" from the factory. Only those components which have levels less than indicated below should have additional oil installed.

Engine - Full mark to 6 mm (.24 in.) below full mark.

Transmission

a) Automatic - With engine idling, transmission selector in "Park", vehicle on a level surface and oil temperature between 10 to 38~C the oil level on the following transmissions should be as indicated:

440-T4 Transmission:

Oil level should be in middle of cross-hatch area.

125/125C Transmission:

Oil level should be slightly above full level.

All other Transmissions:

Oil level should be slightly below add level. If oil level gauge has dimples below add mark, oil level should be between these two dimples.

b) Manual 1) Lower edge of inspection plug hole on rear wheel drive vehicles.

2) Between cold level range dimples or at cold level mark on front wheel drive vehicles.

Differential - Lower edge of inspection plug hole to 9.5 mm

(.37 in.) below lower edge of inspection plug hole.

Transfer Case - Lower edge of inspection plug hole.

Figure 1

Fluid - A/T: Technical Service Bulletins A/T - DEXRON III Fluid Introduction

File In Section: 0 - General Information

Bulletin No.: 57-02-01

Date: March, 1995

SERVICE MANUAL UPDATE

Subject: Section 0 - General Information - DEXRON(R)-III Transmission Fluid Introduction

Models: 1995 and Prior Passenger Cars and Trucks

General Motors has phased in a new automatic transmission fluid, DEXRON(R)-III, that does not need replacing under normal service. DEXRON(R)-III is designed to help the transmission deliver the best possible performance under all conditions. Refer to Figure 1.

The improvements in DEXRON(R)-III include better friction stability, more high temperature oxidation stability and better material compatibility. DEXRON(R)-III has the same low temperature fluidity as DEXRON(R)-IIE, for better transmission performance in cold weather.

DEXRON(R)-IIE and DEXRON(R)-III are fully compatible.

DEXRON(R)-III is fully compatible with any General Motors passenger vehicle or light truck with automatic transmission and built since 1949.

Dealers should require their supplier to include the DEXRON(R)-III license number on all automatic transmission fluid invoices.

Starting February 1, 1994 DEXRON(R)-III was phased into all North American assembly plants.

DEXRON(R)-III fluid is available from GMSPO (see fluid numbers below):

U.S.

1 Quart 12346143

1 Gallon 12346144

55 Gallon 12346145

In Canada

1 Liter 10952622

4 Liter 10952623

200 Liter 10952624

The 1995 Automatic Transmission/Transaxle fluid change intervals are the following:

(1994 and prior should use the schedules as written in the Owner's Manual.)

If the vehicle is mainly driven under one or more of these conditions:

In heavy city traffic where the outside temperature regularly reaches 90°F (32°C) or higher.

In hilly or mountainous terrain.

When doing frequent trailer towing.

Uses such as found in taxi, police car or delivery service.

Change the fluid and filter every 50,000 miles (63,000 km).

If the vehicle is not used mainly under any of these conditions, the fluid and filter do not require periodic changing for vehicles under 8,600 GVWR.

Vehicles over 8,600 GVWR change the fluid and filter every 50,000 miles (83,000 km) regardless of driving conditions.

Fluid - A/T: Technical Service Bulletins A/T - New Trans Fluid, Dexron IIE

Number: 92-26-7A

Section: 7A

Date: OCT. 1991

Corporate Bulletin No.: 177125

ASE No.: A2

Subject: DEXRON-IIE AUTOMATIC TRANSMISSION/TRANSAXLE FLUID

Model and Year: 1976-92 ALL TRUCKS WITH AUTOMATIC TRANSMISSION

TRANSMISSION APPLICATIONS: SUBJECT:

All Automatic Transmissions DEXRON-IIE Automatic Transmission/Transaxle Fluid

TRANSMISSION MODELS: VEHICLE APPLICATIONS:

All All HYDRA-MATIC Automatic Transmissions/Transaxles

Bulletin Covers:

General Motors Corporation has developed a new service fill automatic transmission/transaxle fluid which is designated DEXRON-IIE. This fluid is the preferred fluid for all HYDRA-MATIC automatic transmission/transaxles and will eventually replace DEXRON II. DEXRON-IIE is acceptable for use wherever DEXRON II was previously specified. DEXRON II is acceptable for use when DEXRON-IIE is not available. DEXRON-IIE can be used in both electronically and hydraulically controlled transmissions/transaxles.

DEXRON-IIE Advantages:

^ Has better anti-foaming characteristics.

^ Improved low temperature flow characteristics (low temperature viscosity) and improved high temperature oxidation stability.

^ DEXRON-IIE and DEXRON II can be mixed in any ratio. No draining or flushing of system is required.

^ DEXRON-IIE is back serviceable to 1949 for all General Motors automatic transmission/transaxles.

^ No change in transmission/transaxle calibration or reduction in transmission/transaxle durability will occur as a result of using DEXRON-IIE.

Service Parts Information:

PART NUMBER DESCRIPTION

12345881 1 quart container

12345882 1 gallon container

12345883 55 gallon drum

Parts are currently available from GMSPO.

Fluid - A/T: Capacity Specifications

Fluid Capacity Note: THM 350C, 10 qts.; THM 400, 11 qts.; THM 700-R4,

11.5 qts.; THM 475,9.5 qts. Approximate, make final check

with dipstick.

Fluid - A/T: Fluid Type Specifications

THM 700-R4 Transmission

Fluid Type ..... Dextron II

THM 400/475 Transmission

Fluid Type ..... Dextron II

Fluid - M/T: Technical Service Bulletins Maintenance - Updated Minimum Acceptable Oil Levels

85-54 6 (VI) MAR., 1985 Subject:

MINIMUM ACCEPTABLE OIL LEVELS

Model and Year:ALL PASSENGER AND LIGHT DUTY TRUCKS

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2) Between cold level range dimples or at cold level mark on front wheel drive vehicles.

Differential - Lower edge of inspection plug hole to 9.5 mm

(.37 in.) below lower edge of inspection plug hole.

Transfer Case - Lower edge of inspection plug hole.

Fluid - M/T: Capacity Specifications

Tremec 3 Speed

Fluid capacities ..... 3.5 Pts

Saginaw 3 Speed

Fluid Capacities ..... 3.0 Pts

Saginaw (76 mm) 4 Speed

Fluid Capacities ..... 3.2 Pts

Warner 83 mm 4 Speed

Fluid Capacities 3.0

Warner T-4C 4 Speed

Fluid Capacities ..... 4.0 Pts

Warner T-5 (77MM) 5 Speed

Fluid Capacity ..... 5.0 Pts.

Muncie 3 Speed

Fluid Capacities ..... 3.0 Pts

Muncie CH & SM-465 4 Speed

Fluid Capacities ..... 8.2 Pts

Muncie 4 (117MM) Speed

Fluid Capacity ..... 8.2 Pts.

Isuzu M-150 (77.5 mm) 4-Speed

Fluid Capacities ..... 4.2 Pts

Fluid - M/T: Fluid Type Specifications

Tremec 3 Speed

Fluid Type ..... 80W Gear Oil

Saginaw 3 Speed

Fluid Type ..... 80W Gear Oil

Saginaw (76 mm) 4 Speed

Fluid Type ..... 80W-90 Gear Oil

Warner 83 mm 4 Speed

Fluid Type ..... 80W Gear Oil

Warner T-4C 4 Speed

Fluid Types ..... Dextron II ATF

Muncie 3 Speed

Fluid Type ..... 80W Gear Oil

Muncie CH & SM-465 4 Speed

Fluid Types ..... 80W-90 Gear Oil

Muncie 4 (117MM) Speed

Lubricant Type ..... 80W-90 Gear Oil

Isuzu M-150 (77.5 mm) 4-Speed

Fluid Types ..... Dextron II ATF

Warner T-5 (77MM) 5 Speed

Lubricant Type ..... Dextron II ATF

Fluid - Differential: Customer Interest Locking Differential - Chattering on Turns

Number: 91-370-0B

Section: 0B

Date: JULY 1991

Corporate Bulletin No.: 964201R

Subject: LOCKING DIFFERENTIAL LUBRICANT

Model and Year: 1982-91 ALL TRUCKS WITH G80 REAR AXLE

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 90-139-4A, DATED JANUARY 1990. CONDITION DESCRIPTION AND CORRECTION HAVE BEEN ADDED AS WELL AS THE 1991 MODEL YEAR. ALL COPIES OF 90-139-4A SHOULD BE DISCARDED.

Some light duty trucks equipped with locking rear axles (G80) may exhibit rear axle chatter, especially when turning a corner from a stop.

This condition of alternate engagement and disengagement of the clutches in the differential assembly is usually caused by contaminated axle lubricant.

To correct this condition, drain and refill the rear axle with SAE 80W-90 GL5 (P/N 1052271). The use of any additive in locking rear axles (G80) is not recommended. Rear axle additives are designed for use in limited slip differentials which are normally installed in cars. All light duty trucks equipped with RPO G80 make use of a locking differential and the use of additives will delay the engagement of the locking mechanism and may decrease axle life.

VEHICLES/COMPONENTS INVOLVED:

Some light duty trucks equipped with locking rear axles, RPO G80.

SERVICE PARTS INFORMATION:

Part Number Description

1052271 Lubricant, Rear Axle (24 oz.)

See Appropriate Parts Manual Gasket, Rear Axle Housing Cover

Parts are currently available through GMSPO.

WARRANTY INFORMATION:

As specified in Light Duty Truck Maintenance Schedules, locking rear axle fluid drain and refill is required owner maintenance at the first engine oil change. Failure to drain and refill the rear axle as specified may contribute to a later axle chatter condition. Refer to the appropriate Light Duty Truck Maintenance Schedule or service manual, section 0B, for further details on change intervals.

For those vehicles repaired under warranty, which have had the axle fluid changed at the first oil change and have experienced rear axle chatter use:

Labor Operation: F2010

Use applicable labor time guide for labor hours.

Rear Axles with Non Limited-Slip or Non Locking Differentials	
Vehicle Line	**Recommended Axle Lubricant**
1994 through 1997 Camaro and Firebird and Geo (Chevrolet) Tracker	GM P/N 12345977 or an SAE 80W-90 GL-5 Gear Lubricant
1998 and 1999 Camaro and Firebird	GM P/N 12378261, SAE 75W-90 Synthetic Axle Lubricant
HD-3500 Trucks (Dana 11.0" axles)	GM P/N 12346140, SAE 75W-140 Synthetic Gear Lubricant
Cadillac Catera	GM P/N 12345977 or an SAE 80W-90 GL-5 Gear Lubricant
1999 GMT 800 Trucks	GM P/N 12378261, SAE 75W-90 Synthetic Axle Lubricant
All other non limited-slip or non locking differentials including B and D cars, S/T, M/L, G, P, and C/K trucks except GMT 800 trucks, and as noted above	GM P/N 1052271 or an SAE 80W-90 GL-5 Gear Lubricant

Fluid - Differential: All Technical Service Bulletins Drivetrain - Recommended Axle Lubricant

File In Section: 0 - General Information

Bulletin No.: 76-02-02A

Date: October, 1998

INFORMATION

Subject: Recommended Axle Lubricant

Models: 1999 and Prior Rear Wheel Drive Passenger Cars, Light and Medium Duty Trucks, and Four Wheel Drive Vehicles

This bulletin is being revised to add the 1998 and 1999 Model Years and add Vehicle Line and Recommended Axle Lubricant Information. Please discard Corporate Bulletin Number 76-02-02 (Section 0 - General Information).

The following tables provide the latest information on recommended axle lubricant.

Rear Axles with Limited-Slip or Locking Differentials	
Vehicle Line	**Recommended Axle Lubricant**
1994 through 1997 Camaro and Firebird, 1998 or older Chevrolet Corvette	Use ONLY GM P/N 12345977 PLUS 4 ounces of GM P/N 1052358 Limited Slip Additive
1998 and 1999 Camaro and Firebird, 1999 Corvette	GM P/N 12378261, SAE 75W-90 Synthetic Axle Lubricant. With a complete drain and refill, 4 ounces of GM P/N 1052358 Limited Slip Additive
1996 and older B and D cars, and 1993 and older Camaro and Firebird	Use ONLY GM P/N 1052271 PLUS 4 ounces of GM P/N 1052358 Limited Slip Additive
1999 GMT 800 Trucks	GM P/N 12378261, SAE 75W-90 Synthetic Axle Lubricant (Do NOT add Limited Slip Additive)
All other limited-slip or locking differentials including C/K (non GMT 800), S/T, M/L, G Trucks	Use ONLY GM P/N 1052271 (Do NOT add Limited Slip Additive)

Medium Duty Trucks (Topkick, Kodiak, etc.)	
Vehicle Line	**Recommended Axle Lubricant**
Medium Duty trucks	GM P/N 12345841, SAE 75W-90 Synthetic axle lubricant for Medium Duty Trucks (Eaton RoadRanger Axle Lubricant)

Front Axles on 4-Wheel Drive Vehicles	
Vehicle Line	**Recommended Axle Lubricant**
Front axles in 4-wheel drive vehicles other than Geo (Chevrolet) Tracker	GM P/N 1052271 or an SAE 80W-90 GL-5 Gear Lubricant
Front axles in 4-wheel drive vehicles in cold climates when excessive shift effort is required to shift into 4-wheel drive	GM P/N 12345836, SAE 75W-90 Synthetic Cold Climate Front Axle Lubricant
Geo (Chevrolet) Tracker	GM P/N 12345977 or an SAE 80W-90 GL-5 Gear Lubricant

Parts Information

Parts are currently available from GMSPO.

Fluid - Differential: All Technical Service Bulletins Locking Differential - Chattering on Turns

Number: 91-370-0B

Section: 0B

Date: JULY 1991

Corporate Bulletin No.: 964201R

Subject: LOCKING DIFFERENTIAL LUBRICANT

Model and Year: 1982-91 ALL TRUCKS WITH G80 REAR AXLE

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Some light duty trucks equipped with locking rear axles (G80) may exhibit rear axle chatter, especially when turning a corner from a stop.

This condition of alternate engagement and disengagement of the clutches in the differential assembly is usually caused by contaminated axle lubricant.

To correct this condition, drain and refill the rear axle with SAE 80W-90 GL5 (P/N 1052271). The use of any additive in locking rear axles (G80) is not recommended. Rear axle additives are designed for use in limited slip differentials which are normally installed in cars. All light duty trucks equipped with RPO G80 make use of a locking differential and the use of additives will delay the engagement of the locking mechanism and may decrease axle life.

VEHICLES/COMPONENTS INVOLVED:

Some light duty trucks equipped with locking rear axles, RPO G80.

SERVICE PARTS INFORMATION:

Part Number Description

1052271 Lubricant, Rear Axle (24 oz.)

See Appropriate Parts Manual Gasket, Rear Axle Housing Cover

Parts are currently available through GMSPO.

WARRANTY INFORMATION:

As specified in Light Duty Truck Maintenance Schedules, locking rear axle fluid drain and refill is required owner maintenance at the first engine oil change. Failure to drain and refill the rear axle as specified may contribute to a later axle chatter condition. Refer to the appropriate Light Duty Truck Maintenance Schedule or service manual, section 0B, for further details on change intervals.

For those vehicles repaired under warranty, which have had the axle fluid changed at the first oil change and have experienced rear axle chatter use:

Labor Operation: F2010

Use applicable labor time guide for labor hours.

Fluid - Differential: All Technical Service Bulletins Maintenance - Updated Minimum Acceptable Oil Levels

85-54 6 (VI) MAR., 1985 Subject:

MINIMUM ACCEPTABLE OIL LEVELS

Model and Year:ALL PASSENGER AND LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

This cancels and replaces Chevrolet Dealer Service Information Bulletin 83-I-57 which should be destroyed.

The following chart provides a guide for minimum acceptable oil levels "as received" from the factory. Only those components which have levels less than indicated below should have additional oil installed.

Engine - Full mark to 6 mm (.24 in.) below full mark.

Transmission

a) Automatic - With engine idling, transmission selector in "Park", vehicle on a level surface and oil temperature between 10 to 38~C the oil level on the following transmissions should be as indicated:

440-T4 Transmission:

Oil level should be in middle of cross-hatch area.

125/125C Transmission:

Oil level should be slightly above full level.

All other Transmissions:

Oil level should be slightly below add level. If oil level gauge has dimples below add mark, oil level should be between these two dimples.

b) Manual 1) Lower edge of inspection plug hole on rear wheel drive vehicles.

2) Between cold level range dimples or at cold level mark on front wheel drive vehicles.

Differential - Lower edge of inspection plug hole to 9.5 mm

(.37 in.) below lower edge of inspection plug hole.

Transfer Case - Lower edge of inspection plug hole.

Hood: All Technical Service Bulletins Hood - Sheet Metal Movement

Number: 88-286-10

Section: 10

Date: JULY, 1988

Subject: HOOD SHEET METAL MOVEMENT

Model and Year: 1988 AND PRIOR LIGHT DUTY TRUCKS, G-VANS AND M-VANS

TO: ALL CHEVROLET DEALERS

Some vehicles may experience a hood flutter condition due to a loss of adhesion between the hood panel and underhood support braces.

When the vehicle is driven, air enters the engine compartment and forces the hood upward. Variations in the road surface and in the amount of air passing through the engine compartment cause the hood panel to move up and down (Flutter).

To correct this condition remove the adhesive which is not bonding the hood panel to the underhood support braces. Remove all grease and dirt from the area where new adhesive will be applied. The replacement adhesive should be a fast curing structural adhesive such as that offered in 3M Hood Flutter Repair Kit P/N 051135-08105. Other suitable adhesives may exist.

For vehicles under warranty use:

Labor Operation: T7600

Labor Time: .3 hr

Add w/Hood Insulation: .1 hr

Fluid - Differential: Specifications

Rear Fluid Capacity Note: With 8 1/2 inch ring gear, 4.2 pts.; with 10 1/2

inch Chevrolet ring gear,7.2 pts.; others, 5.5 pts.

Fluid - Transfer Case: Technical Service Bulletins Maintenance - Updated Minimum Acceptable Oil Levels

85-54 6 (VI) MAR., 1985 Subject:

MINIMUM ACCEPTABLE OIL LEVELS

Model and Year:ALL PASSENGER AND LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

This cancels and replaces Chevrolet Dealer Service Information Bulletin 83-I-57 which should be destroyed.

The following chart provides a guide for minimum acceptable oil levels "as received" from the factory. Only those components which have levels less than indicated below should have additional oil installed.

Engine - Full mark to 6 mm (.24 in.) below full mark.

Transmission

a) Automatic - With engine idling, transmission selector in "Park", vehicle on a level surface and oil temperature between 10 to 38~C the oil level on the following transmissions should be as indicated:

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Oil level should be in middle of cross-hatch area.

125/125C Transmission:

Oil level should be slightly above full level.

All other Transmissions:

Oil level should be slightly below add level. If oil level gauge has dimples below add mark, oil level should be between these two dimples.

b) Manual 1) Lower edge of inspection plug hole on rear wheel drive vehicles.

2) Between cold level range dimples or at cold level mark on front wheel drive vehicles.

Differential - Lower edge of inspection plug hole to 9.5 mm

(.37 in.) below lower edge of inspection plug hole.

Transfer Case - Lower edge of inspection plug hole.

Engine Oil: Technical Service Bulletins Engine - GM dexos 1 and dexos 2(R) Oil Specifications

INFORMATION

Bulletin No.: 11-00-90-001

Date: March 14, 2011

Subject: Global Information for GM dexos1(TM) and GM dexos2(TM) Engine Oil Specifications for Spark Ignited and Diesel Engines, Available Licensed Brands, and Service Fill for Adding or Complete Oil Change

Models:

2012 and Prior GM Passenger Cars and Trucks Excluding All Vehicles Equipped with Duramax(TM) Diesel Engines

GM dexos 1(TM) Information Center Website

Refer to the following General Motors website for dexos 1(TM) information about the different licensed brands that are currently available: http://www.gmdexos.com

GM dexos 1(TM) Engine Oil Trademark and Icons

The dexos(TM) specification and trademarks are exclusive to General Motors, LLC.

Only those oils displaying the dexos‹›(TM) trademark and icon on the front label meet the demanding performance requirements and stringent quality standards set forth in the dexos‹›(TM) specification.

Look on the front label for any of the logos shown above to identify an authorized, licensed dexos 1(TM) engine oil.

GM dexos 1(TM) Engine Oil Specification

Important General Motors dexos 1(TM) engine oil specification replaces the previous General Motors specifications GM6094M, GM4718M and GM-LL-A-025 for most GM gasoline engines. The oil specified for use in GM passenger cars and trucks, PRIOR to the 2011 model year remains acceptable for those previous vehicles. However, dexos 1(TM) is backward compatible and can be used in those older vehicles.

In North America, starting with the 2011 model year, GM introduced dexos 1(TM) certified engine oil as a factory fill and service fill for gasoline engines. The reasons for the new engine oil specification are as follows:

- To meet environmental goals such as increasing fuel efficiency and reducing engine emissions.

- To promote long engine life.

- To minimize the number of engine oil changes in order to help meet the goal of lessening the industry's overall dependence on crude oil.

dexos 1(TM) is a GM-developed engine oil specification that has been designed to provide the following benefits:

- Further improve fuel economy, to meet future corporate average fuel economy (CAFE) requirements and fuel economy retention by allowing the oil to maintain its fuel economy benefits throughout the life of the oil.

- More robust formulations for added engine protection and aeration performance.

- Support the GM Oil Life System, thereby minimizing the replacement of engine oil, before its life has been depleted.

- Reduce the duplication of requirements for a large number of internal GM engine oil specifications.

International Lubricants Standardization and Approval Committee (ILSAC)

GF-5 Standard

In addition to GM dexos 1(TM), a new International Lubricants Standardization and Approval Committee (ILSAC) standard called GF-5, was introduced in October 2010.

- There will be a corresponding API category, called: SN Resource Conserving. The current GF-4 standard was put in place in 2004 and will become obsolete in October 2011. Similar to dexos 1(TM), the GF-5 standard will use a new fuel economy test, Sequence VID, which demands a statistically significant increase in fuel economy versus the Sequence VIB test that was used for GF-4.

- It is expected that all dexos 1(TM) approved oils will be capable of meeting the GF-5 standard. However, not all GF-5 engine oils will be capable of meeting the dexos 1(TM) specification.

- Like dexos(TM), the new ILSAC GF-5 standard will call for more sophisticated additives. The API will begin licensing marketers during October 2010, to produce and distribute GF-5 certified products, which are expected to include SAE 0W-20, 0W-30, 5W-20, 5W-30 and 10W-30 oils.

Corporate Average Fuel Economy (CAFE) Requirements Effect on Fuel Economy

Since CAFE standards were first introduced in 1974, the fuel economy of cars has more than doubled, while the fuel economy of light trucks has increased by more than 50 percent. Proposed CAFE standards call for a continuation of increased fuel economy in new cars and trucks. To meet these future requirements, all aspects of vehicle operation are being looked at more critically than ever before.

New technology being introduced in GM vehicles designed to increase vehicle efficiency and fuel economy include direct injection, cam phasing, turbocharging and active fuel management (AFM). The demands of these new technologies on engine oil also are taken into consideration when determining new oil specifications. AFM for example can help to achieve improved fuel economy. However alternately deactivating and activating the cylinders by not allowing the intake and exhaust valves to open contributes to additional stress on the engine oil.

Another industry trend for meeting tough fuel economy mandates has been a shift toward lower viscosity oils.

dexos 1(TM) will eventually be offered in several viscosity grades in accordance with engine needs: SAE 0W-20, 5W-20, 0W-30 and 5W-30.

Using the right viscosity grade oil is critical for proper engine performance. Always refer to the Maintenance section of a vehicle Owner Manual for the proper viscosity grade for the engine being serviced.

GM Oil Life System in Conjunction With dexos (TM) Supports Extended Oil Change Intervals

To help conserve oil while maintaining engine protection, many GM vehicles are equipped with the GM Oil Life System. This system can provide oil change intervals that exceed the traditional 3,000 mile (4,830 km) recommendation.

The dexos (TM) specification, with its requirements for improved oil robustness, compliments the GM Oil Life System by supporting extended oil change intervals over the lifetime of a vehicle.

If all GM customers with GM Oil Life System equipped vehicles would use the system as intended, GM estimates that more than 100 million gallons of oil could be saved annually.

GM dexos 2(TM) Information Center Website

Refer to the following General Motors website for dexos 2(TM) information about the different licensed brands that are currently available: http://www.gmdexos.com

GM dexos 2(TM) Engine Oil Trademark and Icons

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

The dexos (TM) specification and trademarks are exclusive to General Motors, LLC.

Only those oils displaying the dexos (TM) trademark and icon on the front label meet the demanding performance requirements and stringent quality standards set forth in the dexos (TM)specification.

Look on the front label for any of the logos shown above to identify an authorized, licensed dexos 2(TM) engine oil.

GM dexos 2(TM) Engine Oil Specification

- dexos 2(TM) is approved and recommended by GM for use in Europe starting in model year 2010 vehicles, regardless of where the vehicle was manufactured.

- dexos 2(TM) is the recommended service fill oil for European gasoline engines.

Important The Duramax(TM) diesel engine is the exception and requires lubricants meeting specification CJ-4.

- dexos 2(TM) is the recommended service fill oil for European light-duty diesel engines and replaces GM-LL-B-025 and GM-LL-A-025.

- dexos 2(TM) protects diesel engines from harmful soot deposits and is designed with limits on certain chemical components to prolong catalyst life and protect expensive emission reduction systems. It is a robust oil, resisting degradation between oil changes and maintaining optimum performance longer.

Disclaimer

Engine Oil: Technical Service Bulletins Maintenance - Updated Minimum Acceptable Oil Levels

85-54 6 (VI) MAR., 1985 Subject:

MINIMUM ACCEPTABLE OIL LEVELS

Model and Year:ALL PASSENGER AND LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

This cancels and replaces Chevrolet Dealer Service Information Bulletin 83-I-57 which should be destroyed.

The following chart provides a guide for minimum acceptable oil levels "as received" from the factory. Only those components which have levels less than indicated below should have additional oil installed.

Engine - Full mark to 6 mm (.24 in.) below full mark.

Transmission

a) Automatic - With engine idling, transmission selector in "Park", vehicle on a level surface and oil temperature between 10 to 38~C the oil level on the following transmissions should be as indicated:

440-T4 Transmission:

Oil level should be in middle of cross-hatch area.

125/125C Transmission:

Oil level should be slightly above full level.

All other Transmissions:

Oil level should be slightly below add level. If oil level gauge has dimples below add mark, oil level should be between these two dimples.

b) Manual 1) Lower edge of inspection plug hole on rear wheel drive vehicles.

2) Between cold level range dimples or at cold level mark on front wheel drive vehicles.

Differential - Lower edge of inspection plug hole to 9.5 mm

(.37 in.) below lower edge of inspection plug hole.

Transfer Case - Lower edge of inspection plug hole.

Engine Oil: Technical Service Bulletins Engine Oil - Discoloration (Oil Dye)

Number: 86-25

Section: 6

Date: Jan. 1986

Subject: ENGINE OIL DISCOLORATION

Model and Year ALL 1985-1986 MODELS

TO: ALL CHEVROLET DEALERS

General Motors Corporation engine plants utilize engine oil dye from time to time in various engines as an aid to oil leak detection during the manufacturing process. The dye causes the oil to glow bright yellow when exposed to a "black" light. There are several sources for "black" lights, such as Kent Moore Tool, Snap-On Tool, Mac Tool, etc.

Some of the dye material used gives the oil a slight red or green tint, and in some cases has been mistaken by service personnel for automatic transmission fluid or engine coolant. If the engine oil was contaminated with engine coolant, the oil would be a gray or "milky white" color. Transmission oil would tint the engine oil light pink, however, it would not glow bright yellow when exposed to a "black" light.

Dealers should be advised that the dye is in no way detrimental and that the oil should not be changed if this condition exists.

If the engine oil is suspected of being contaminated with foreign material, a small sample (1/4 cup) should be exposed to a "black light". If the oil sample does not glow bright yellow, it is possible that the oil is contaminated and should be changed to prevent engine damage.

Engine Oil: Specifications

Engine Oil with Filter ..... 5.0 quarts (4.7 liters)

NOTE: All capacities are approximate. When adding, be sure to fill to the approximate level. Recheck fluid level after filling

BULLETIN BEING REVISED TO ADD MODEL YEARS 1993-94, ADDED LIGHT TRUCKS AND REVISED "IMPORTANT" STATEMENT FOUND LISTED BELOW STEP 3. UNDER SUB-TITLE 'BLEEDING THE POWER STEERING SYSTEM'. PREVIOUS DIVISIONAL PUBLICATION NUMBERS WERE:

DIVISION	BULLETIN NUMBER
BUICK	91-3-8
CADILLAC	T-91-83
CANADA	91-3-117
CHEVROLET	91-208-3B
OLDSMOBILE	91-3-117
PONTIAC	91-3-12

DIVISION	BULLETIN NUMBER
BUICK	88-POL-4
CADILLAC	88-P-1
CHEVROLET	88-417-3B
OLDSMOBILE	88-T-139
PONTIAC	88-SM-10

Power Steering Fluid: Customer Interest P/S - Reduced Assist When Cold

Group Ref.: Steering/Suspension

Bulletin No.: 033206

Date: March 1994

SUBJECT: REDUCED POWER STEERING ASSIST AT LOW AMBIENT TEMPERATURES (NEW POWER STEERING FLUID)

MODELS: 1994 AND PRIOR PASSENGER CARS AND LIGHT DUTY TRUCKS

Applications:

Appropriate for all passenger vehicles, but particularly beneficial in 1980 and later FWD Models equipped with Power Rack and Pinion Steering.

CONDITION:

Comments of reduced power steering assist at low ambient temperatures (approximately 10°F and lower) may be noted by some vehicle operators when turning the steering wheel in BOTH the right and left direction during warm-up after cold start. All vehicles with power steering exhibit this condition to varying degrees, but condition may be more noticeable with power rack and pinion steering systems that typically have longer hoses and cooler lines.

Note:

This condition, which is related to power steering fluid viscosity, should not, however, be confused with conditions having similar symptoms such as that described divisional Special Policy numbers listed:

CAUSE:

In cold weather, power steering fluid thickens in the same manner as any other petroleum-based oil or fluid. Upon cold starting, the fluid resists movement through the system and the driver senses reduced power assist (sometimes referred to as "stiff steer"). As the vehicle operates and fluid circulates through the power steering system, the fluid warms and thins to its normal operating viscosity.

CORRECTION: Saginaw Division has developed a new Low Temperature Climate Service Fluid for use in cold climates. Compared with conventional power steering fluid, this new fluid flows better at low temperatures and resists the thickening which contributes to reduced power assist upon start up.

RACK AND PINION STEERING SYSTEMS Reduced power assist upon cold weather starting may be more noticeable in Power Rack and Pinion steering systems that may contain six or more feet of

Container Size	Part Number
16 ounce	12345866
32 ounce	12345867

pressure and return hose along with long cooler lines. Such long systems contain greater volumes of fluid and vehicles so equipped tend to have longer periods of reduced power assist. The new fluid performs particularly well with current designed Rack and Pinion steering systems and special remanufactured Rack and Pinion Steering Assemblies.

PARTS INFORMATION:

Low Temperature Climate Service Fluid is available from GMSPO. Order as:

Parts are currently available from GMSPO.

SERVICE PROCEDURE: The power steering fluid replacement procedure is a two-stage process: first, flushing the old fluid from the system with new fluid; and second, bleeding the system to remove any trapped air. The two sequences outline the steps in each procedure.

FLUSHING THE POWER STEERING SYSTEM 1.

Raise the front end of the vehicle off the ground until the wheels are free to turn.

2. Remove the fluid return line at the pump reservoir inlet connector.

3. Plug the inlet connector port on the pump reservoir.

4. Position the fluid return line toward a large container in order to catch the draining fluid.

5. While a second person fills the reservoir with new Low Temperature Climate Service Fluid, start and run the engine at idle.

6. Turn the steering wheel from stop to stop.

NOTICE:

Do not hold the wheel against stops while flushing the system, Holding steering wheel against wheel stops will cause high system pressure, overheating, and damage to the pump and/or gear.

7. Continue draining until all of the old fluid is cleared from the power steering system. Addition of approximately 1 quart of new fluid will be required to flush system.

8. Unplug pump reservoir inlet and reconnect return line.

9. Turn engine off, and fill reservoir to the "Full Cold" mark.

10. Continue with following procedure "Bleeding the Power Steering System".

Bleeding Air from Power Steering Systems

Before bleeding: Inspect steering system. Check, and correct as needed:

Hoses must not touch any other part of vehicle.

- Steering system noise could be caused by hose touching frame, body, or engine.

All hose connections must be tight.

- Loose connections might not leak but could allow air into system.

When to bleed:
After any component replacement
After disconnecting fluid line
In case of steering system noise

Why bleed?
To prevent pump damage
To ensure proper system operation
To stop steering system noise

Power Steering Fluid
Use only clean, new power steering fluid. Fluid must be:

Conventional Climate:
GM #1052884 – 16 ounce
#1050017 – 32 ounce

Cold Climate:
GM #12345868 – 16 ounce
#12345867 – 32 ounce

How to bleed:

1.

Switch ignition off.

2.
Raise front wheels off ground.

3.
Turn steering wheel full left.

4.
Fill fluid reservoir to "FULL COLD" level. Leave cap off.

5.
With assistant checking fluid level and condition, turn steering wheel lock-to-lock at least 20 times. Engine remains off.
   - On systems with long return lines or fluid coolers, turn steering wheel lock-to-lock at least 40 times.
   - Trapped air may cause fluid to overflow. Thoroughly clean any spilled fluid to allow for leak check.
   - Keep fluid level at "FULL COLD."

6.
While turning wheel, check fluid constantly.
   - No bubbles are allowed.
   - For any sign of bubbles, recheck connections. Repeat step 5.

7.

Start engine. With engine idling, maintain fluid level. Reinstall cap.

8.
Return wheels to center. Lower front wheels to ground.

9.

Keep engine running for two minutes.

10.
Turn steering wheel in both directions.

Verify:
- ☑ Smooth power assist
- ☑ Noiseless operation
- ☑ Proper fluid level
- ☑ No system leaks
- ☑ Proper fluid condition
- No bubbles, no foam, no discoloration

11. If all proper conditions apply, procedure is complete.

12. If any problem remains, see "Special Conditions."

Special Conditions:

Fluid

- Foam or bubbles in fluid
  Fluid must be completely free of bubbles. In step 5, be alert to periodic bubbles that could indicate a loose connection or leaky O-ring seal in either the return hose or pressure hose.
- Discolored fluid
  (milky, opaque, or light tan color)

Switch ignition off. Wait two minutes. Recheck hose connections. Repeat steps 7-10. If condition still exists, replace and check a possible cause:
- ☑ Return hose clamps
- ☑ Return hose O-ring
- ☑ Pressure hose O-rings
- ☑ Gear cylinder line O-rings

Fill system and repeat bleed procedure for each possible cause. Repeat steps 7-10 to verify whether noise has been eliminated.

Noise

- Pump whine or groan

With engine running, recheck hoses for possible contact with frame body or engine. If no contact is found, follow either method below to cool down fluid and repressurize system.

Method 1: Normal Cool Down
Switch engine off.
Wait for system to cool.
Install reservoir cap.

Method 2: Partial Fluid Replacement
Switch engine off.
Use a suction device to remove fluid from reservoir.
Refill with cool, clean fluid.
Install reservoir cap.

After either method of cooling, start engine and allow engine to come up to operating temperature. If noise persists, remove and replace power steering pump. Repeat bleed procedure following pump replacement.

BLEEDING THE POWER STEERING SYSTEM After replacing the fluid or servicing the power steering hydraulic system, you must bleed air from the system. Air in the system prevents an accurate fluid level reading, causes pump cavitation noise and over time could damage the pump. To bleed the power steering system proceed as follows:

1. Begin with the engine off, front wheels off the ground, and wheels turned all the way to the left.

2. Add Low Temperature Climate Service Fluid to the "FULL COLD" mark on the fluid level indicator.

3. Bleed the system by turning the wheels from side to side without hitting stops.

Important:

This may require turning the wheels from side to side twenty times. On systems with long return lines or fluid coolers, turning steering wheel lock-to-lock forty times may be required. Keep the fluid

level at the "FULL COLD" mark. Fluid with air In it has a light tan appearance. This air must be eliminated from the fluid before normal steering action can be obtained.

4. Start the engine. With the engine idling, recheck the fluid level. If necessary, add fluid to bring the level to the "FULL COLD" mark.

5. Return the wheels to the center position. Lower front wheels to the ground. Continue running the engine for two or three minutes.

6. Test the vehicle to be sure the steering functions normally and is free from noise.

Important:

Inspect for fluid leakage at connection points along the power steering system.

7. Recheck the fluid level as described in Steps 3 and 4 except that the fluid level should now be up to the "FULL HOT" mark after the system has stabilized at its normal operating temperature.

BULLETIN BEING REVISED TO ADD MODEL YEARS 1993-94, ADDED LIGHT TRUCKS AND REVISED "IMPORTANT" STATEMENT FOUND LISTED BELOW STEP 3. UNDER SUB-TITLE 'BLEEDING THE POWER STEERING SYSTEM'. PREVIOUS DIVISIONAL PUBLICATION NUMBERS WERE:

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DIVISION	BULLETIN NUMBER
BUICK	88-POL-4
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CHEVROLET	88-417-3B
OLDSMOBILE	88-T-139
PONTIAC	88-SM-10

Power Steering Fluid: All Technical Service Bulletins P/S - Reduced Assist When Cold

Group Ref.: Steering/Suspension

Bulletin No.: 033206

Date: March 1994

SUBJECT: REDUCED POWER STEERING ASSIST AT LOW AMBIENT TEMPERATURES (NEW POWER STEERING FLUID)

MODELS: 1994 AND PRIOR PASSENGER CARS AND LIGHT DUTY TRUCKS

Applications:

Appropriate for all passenger vehicles, but particularly beneficial in 1980 and later FWD Models equipped with Power Rack and Pinion Steering.

CONDITION:

Comments of reduced power steering assist at low ambient temperatures (approximately 10°F and lower) may be noted by some vehicle operators when turning the steering wheel in BOTH the right and left direction during warm-up after cold start. All vehicles with power steering exhibit this condition to varying degrees, but condition may be more noticeable with power rack and pinion steering systems that typically have longer hoses and cooler lines.

Note:

This condition, which is related to power steering fluid viscosity, should not, however, be confused with conditions having similar symptoms such as that described divisional Special Policy numbers listed:

CAUSE:

In cold weather, power steering fluid thickens in the same manner as any other petroleum-based oil or fluid. Upon cold starting, the fluid resists movement through the system and the driver senses reduced power assist (sometimes referred to as "stiff steer"). As the vehicle operates and fluid circulates through the power steering system, the fluid warms and thins to its normal operating viscosity.

CORRECTION: Saginaw Division has developed a new Low Temperature Climate Service Fluid for use in cold climates. Compared with conventional power steering fluid, this new fluid flows better at low temperatures and resists the thickening which contributes to reduced power assist upon start up.

RACK AND PINION STEERING SYSTEMS Reduced power assist upon cold weather starting may be more noticeable in Power Rack and Pinion steering systems that may contain six or more feet of

Container Size	Part Number
16 ounce	12345866
32 ounce	12345867

pressure and return hose along with long cooler lines. Such long systems contain greater volumes of fluid and vehicles so equipped tend to have longer periods of reduced power assist. The new fluid performs particularly well with current designed Rack and Pinion steering systems and special remanufactured Rack and Pinion Steering Assemblies.

PARTS INFORMATION:

Low Temperature Climate Service Fluid is available from GMSPO. Order as:

Parts are currently available from GMSPO.

SERVICE PROCEDURE: The power steering fluid replacement procedure is a two-stage process: first, flushing the old fluid from the system with new fluid; and second, bleeding the system to remove any trapped air. The two sequences outline the steps in each procedure.

FLUSHING THE POWER STEERING SYSTEM 1.

Raise the front end of the vehicle off the ground until the wheels are free to turn.

2. Remove the fluid return line at the pump reservoir inlet connector.

3. Plug the inlet connector port on the pump reservoir.

4. Position the fluid return line toward a large container in order to catch the draining fluid.

5. While a second person fills the reservoir with new Low Temperature Climate Service Fluid, start and run the engine at idle.

6. Turn the steering wheel from stop to stop.

NOTICE:

Do not hold the wheel against stops while flushing the system, Holding steering wheel against wheel stops will cause high system pressure, overheating, and damage to the pump and/or gear.

7. Continue draining until all of the old fluid is cleared from the power steering system. Addition of approximately 1 quart of new fluid will be required to flush system.

8. Unplug pump reservoir inlet and reconnect return line.

9. Turn engine off, and fill reservoir to the "Full Cold" mark.

10. Continue with following procedure "Bleeding the Power Steering System".

Bleeding Air from Power Steering Systems

Before bleeding: Inspect steering system. Check, and correct as needed:

Hoses must not touch any other part of vehicle.

- Steering system noise could be caused by hose touching frame, body, or engine.

All hose connections must be tight.

- Loose connections might not leak but could allow air into system.

When to bleed:
After any component replacement
After disconnecting fluid line
In case of steering system noise

Why bleed?
To prevent pump damage
To ensure proper system operation
To stop steering system noise

Power Steering Fluid
Use only clean, new power steering fluid. Fluid must be:

Conventional Climate:
GM #1052884 – 16 ounce
#1050017 – 32 ounce

Cold Climate:
GM #12345868 – 16 ounce
#12345867 – 32 ounce

How to bleed:

1.

Switch ignition off.

2.
Raise front wheels off ground.

3.
Turn steering wheel full left.

4.
Fill fluid reservoir to "FULL COLD" level. Leave cap off.

5.
With assistant checking fluid level and condition, turn steering wheel lock-to-lock at least 20 times. Engine remains off.
   - On systems with long return lines or fluid coolers, turn steering wheel lock-to-lock at least 40 times.
   - Trapped air may cause fluid to overflow. Thoroughly clean any spilled fluid to allow for leak check.
   - Keep fluid level at "FULL COLD."

6.
While turning wheel, check fluid constantly.
   - No bubbles are allowed.
   - For any sign of bubbles, recheck connections. Repeat step 5.

7.

Start engine. With engine idling, maintain fluid level. Reinstall cap.

8.
Return wheels to center. Lower front wheels to ground.

9.

Keep engine running for two minutes.

10.
Turn steering wheel in both directions.

Verify:
- ☑ Smooth power assist
- ☑ Noiseless operation
- ☑ Proper fluid level
- ☑ No system leaks
- ☑ Proper fluid condition
- No bubbles, no foam, no discoloration

11. If all proper conditions apply, procedure is complete.

12. If any problem remains, see "Special Conditions."

Special Conditions:

Fluid

- Foam or bubbles in fluid
  Fluid must be completely free of bubbles. In step 5, be alert to periodic bubbles that could indicate a loose connection or leaky O-ring seal in either the return hose or pressure hose.
- Discolored fluid
  (milky, opaque, or light tan color)

Switch ignition off. Wait two minutes. Recheck hose connections. Repeat steps 7-10. If condition still exists, replace and check a possible cause:
- ☑ Return hose clamps
- ☑ Return hose O-ring
- ☑ Pressure hose O-rings
- ☑ Gear cylinder line O-rings

Fill system and repeat bleed procedure for each possible cause. Repeat steps 7-10 to verify whether noise has been eliminated.

Noise

- Pump whine or groan

With engine running, recheck hoses for possible contact with frame body or engine. If no contact is found, follow either method below to cool down fluid and repressurize system.

Method 1: Normal Cool Down
Switch engine off.
Wait for system to cool.
Install reservoir cap.

Method 2: Partial Fluid Replacement
Switch engine off.
Use a suction device to remove fluid from reservoir.
Refill with cool, clean fluid.
Install reservoir cap.

After either method of cooling, start engine and allow engine to come up to operating temperature. If noise persists, remove and replace power steering pump. Repeat bleed procedure following pump replacement.

BLEEDING THE POWER STEERING SYSTEM After replacing the fluid or servicing the power steering hydraulic system, you must bleed air from the system. Air in the system prevents an accurate fluid level reading, causes pump cavitation noise and over time could damage the pump. To bleed the power steering system proceed as follows:

1. Begin with the engine off, front wheels off the ground, and wheels turned all the way to the left.

2. Add Low Temperature Climate Service Fluid to the "FULL COLD" mark on the fluid level indicator.

3. Bleed the system by turning the wheels from side to side without hitting stops.

Important:

This may require turning the wheels from side to side twenty times. On systems with long return lines or fluid coolers, turning steering wheel lock-to-lock forty times may be required. Keep the fluid

level at the "FULL COLD" mark. Fluid with air In it has a light tan appearance. This air must be eliminated from the fluid before normal steering action can be obtained.

4. Start the engine. With the engine idling, recheck the fluid level. If necessary, add fluid to bring the level to the "FULL COLD" mark.

5. Return the wheels to the center position. Lower front wheels to the ground. Continue running the engine for two or three minutes.

6. Test the vehicle to be sure the steering functions normally and is free from noise.

Important:

Inspect for fluid leakage at connection points along the power steering system.

7. Recheck the fluid level as described in Steps 3 and 4 except that the fluid level should now be up to the "FULL HOT" mark after the system has stabilized at its normal operating temperature.

Refrigerant: Technical Service Bulletins A/C - Retrofitting R-12 Vehicles to R-134A

Group Ref.: HVAC

Bulletin No.: 331226

Date: January, 1994

INFORMATION

SUBJECT: RETROFITTING R-12 VEHICLES TO R-134a

MODELS: 1994 AND PRIOR YEARS, PASSENGER CARS AND TRUCKS WITH R-12 A/C SYSTEMS

There has been a great deal of information presented by the media regarding the need to retrofit vehicles produced with R-12, to a substitute refrigerant. This bulletin will outline GM's position and future plans on this subject.

Most important, there is currently NO requirement to retrofit any R-12 vehicle. Vehicles built with R-12 can be serviced with R-12, as long as the refrigerant is available. At some point in time, R-12 may become either too scarce or too expensive to economically justify service on some vehicles with R-12. By that time, GM will provide you with instructions on retrofitting those vehicles from R-12 to R-134a.

GM vehicle divisions, platforms, and component suppliers have been actively working on the details of retrofitting R-12 vehicles. An enormous amount of work is required to determine how hundreds of vehicle models can be satisfactorily retrofitted. Additional information will be provided as it becomes available.

The following items contain important technical information that should answer many of the questions, and correct some misconceptions reported in the media.

SUBSTITUTE REFRIGERANTS

R-134a is the only approved substitute refrigerant that GM recommends and it should only be used if a complete retrofit procedure has been performed. None of the other refrigerants currently being marketed as replacement or drop-in substitutes for R-12 are approved for use in GM vehicles.

R-12 and R-134a are not interchangeable. R-134a cannot be added to fill a low R-12 system. The combination of the two materials can cause high system pressures, which could cause damage to the system.

Retrofitting an R-12 vehicle to R-134a requires careful preparation to insure that neither the vehicle nor the A/C service equipment has become contaminated.

RESIDUAL MINERAL OIL

The concern that mineral oil is chemically incompatible with R-134a and/or PAG lubricant has been proven to be untrue. A normal charge of mineral oil left in the A/C system after a retrofit to R-134a will not damage the system. Mineral oil, however, does not mix well with R-134a, and will not provide adequate lubrication. Tests on both the orifice tube and TXV systems show that the mineral oil parks in places such as the accumulator, and does not appreciably affect performance or damage the system. The retrofit service bulletin will specify the correct oil to be used. It is important that this oil recommendation be followed carefully.

RESIDUAL R-12

Residual R-12 left in a system, due to improper retrofit service procedures, may result in system damage unless the residual R-12 is kept below the 2 percent limit specified by the Society of

Automotive Engineers' Specification J-1661. New service methods are being developed to minimize the level of R-12 remaining in the A/C system after the retrofit procedure is completed. Following these new procedures will be critical to insure that the above limits are met.

SYSTEM FLUSHING

R-11, a material commonly used as an A/C system flushing solvent, has been found to be chemically incompatible with PAG lubricant. Technicians should be aware that residual R-11 remaining in an R-12 system will be very damaging if the vehicle is retrofitted to R-134a later in its life. For many years GM has recommended the use of in-line filters as an alternative to system flushing.

SYSTEM FLUSHING, USING EITHER R-11 OR ANY OTHER FLUSHING MATERIAL, IS NOT APPROVED BY GM FOR ANY A/C SYSTEM.

DESICCANT PROTECTION

It has been reported that the desiccant (moisture absorption material) used in 1992 and older R-12 A/C systems is incompatible with R-134a and PAG oil. The older desiccant was designed specifically for R-12 systems, but testing has shown that it is NOT necessary to replace the older desiccant just because the vehicle is being retrofitted to R-134a. 1993 and newer GM vehicles use desiccant designed to be compatible with both R-12 and R-134a systems.

The amount of desiccant used in most GM vehicles is designed to last for at least seven years. To help maintain adequate protection for vehicles that must be retrofitted, it is recommended that the accumulator/dryer, which contains the desiccant, be replaced if the vehicle is more than five years old.

"O" RINGS

While continuing to service with R-12, be sure to use "O" rings and seal materials which are compatible with R-134a and PAG oil. This practice will eliminate concern in case the vehicle requires retrofitting later in its life. All "O" rings and seal materials available from GMSPO are compatible with R-134a systems.

RETROFITTED SYSTEM PERFORMANCE

Currently, it appears that for most GM vehicles, the retrofit procedure will require minimal changes to the existing system. Some vehicles may need additional parts and/or procedures to provide acceptable performance and/or durability. Our testing has shown that vehicles that have undergone recommended retrofit procedures will, in most climatic conditions, be minimally affected in terms of A/C performance.

SERVICE POLICY

Basic service policy is as follows:

During Warranty - If an R-12 produced vehicle A/C system must be repaired or recharged under warranty, repairs will be completed using R-12. If R-12 is unavailable or unaffordable, GM will notify the dealer body and will pay for the warranty repair and the retrofit to R-134a.

NOTE:

It a customer requests that an in-warranty vehicle be converted to R-134a, and the R-12 system is functioning properly, the customer will be expected to pay for the retrofit.

Out of Warranty - The cost of the conversion will be the responsibility of the customer.

Refrigerant: Technical Service Bulletins A/C Refrigerant - Contamination

File In Section: 1 - HVAC Bulletin No.: 43-12-23 Date: September, 1994

Subject: Contaminated A/C Refrigerant

Models: 1994 and Prior Passenger Cars and Trucks with R12 Air Conditioning Systems

Government regulations limit the production of R12 refrigerant, commonly referred to as Freon, during 1994/1995 and restrict manufacture of new R12 material effective January 1, 1996. As R12 prices rise and supplies are depleted, it is anticipated non-approved substitute refrigerants and/or poor quality R12 material sold as new or reprocessed may become more prevalent.

The Mobile Air Conditioning Society (MACS) recently expressed concern over reports of the sale of R12 refrigerant containing as high as 15% contamination by R22, a refrigerant commonly used in stationary home systems but unsuitable for use in mobile units. GM dealers should be careful to protect against contaminating their existing supplies of R12 or the A/C systems in customers' vehicles they service by dealing with reputable suppliers. All R12 refrigerant purchased for warranty repairs should be purchased through GM SPO to ensure GM quality standards are met.

The use of non-approved R12 refrigerant substitutes, some of which contain flammable materials, has also been reported by MACS. These products are available to "do-it-yourselfers" who, in many cases, believe they are harmless replacements for the small cans of R12 used so commonly in the past. Once added to the A/C system, the vehicle can no longer be serviced using R12 recovery/recycling equipment without:

- Risking permanent damage to recovery/recycling equipment

- Contaminating the previously recovered R12 material in the recovery tank

- Spreading the contamination when the recovered material is used to charge other vehicles

or

- Possible loss of the recovered material if the contaminated level is high enough to activate the air purge system

Contaminated refrigerant also impacts customer satisfaction through poor vehicle A/C performance and loss of A/C system compressor/component durability. System or component failure resulting from the use of refrigerant which does not meet GM specification is not covered by the "New Vehicle Warranty".

Unfortunately, there is no simple method to identify if a "do-it-yourselfer" or repair shop has added to or recharged a system with a non-approved refrigerant. The inability to protect against the spread of contaminated refrigerant threatens the recycling program and the industry's desire to maximize use of the remaining R12 supply.

Beginning in 1993, General Motors STG, Harrison Division, Research Labs and Kent-Moore worked in conjunction with suppliers of various technologies to develop a tester to identify contaminated refrigerant in vehicle A/C systems before recovery. During development of the technology, several dealer service manager focus group studies were conducted to identify design features to best suit dealership needs.

The discussions and surveys clearly indicated the desire for a dedicated instrument, permanently mounted to the refrigerant recovery cart to ensure ALL vehicles are automatically tested prior to recovering refrigerant. Testing ALL refrigerant for contamination prior to recovery is the ONLY means to ensure customer satisfaction, protect recovery equipment and avoid unintentional venting of refrigerant by your dealership.

General Motors has evaluated all available technology for this project and only the J 39851 R12 "Pureguard" meets General Motors' specifications. The J 39851 R12 Pureguard Refrigerant Monitor has been classified as an essential tool and will be shipped by Kent-Moore to your dealership beginning in September of 1994. The essential price of the R12 "Pureguard" is $561 (for Canadian dealers the price is $800 Canadian). If your dealership has multiple R12 recovery equipment, additional units may be ordered from Kent-Moore for $561 at 1-800-345-2233. Features of the R12 "Pureguard" include:

- Universally mounts to R12 Recovery Equipment

- Automatically interrupts power to the Recovery Equipment when contaminated refrigerant is identified

- Fully automatic design does not require technician action, training or interpretation

- LCD displays Pureguard functions

- Meets GM contamination sensitivity requirements

- Self calibrating

- Micro-processor controlled

- Audio alarm alerts technician

Other Refrigerant Identifiers are being advertised which may be available this A/C season. However, ONLY the Kent-Moore J 39851 R12 "Pureguard" meets General Motors' current specifications which ensure recovered refrigerant is compatible with General Motors vehicles and General Motors approved recovery systems.

An R134a Pureguard Refrigerant Identifier is currently under development and is anticipated to be available in early 1995. The contamination of R134a refrigerant is not expected to be a concern until the program to retrofit R12 vehicles to R134a becomes more widely used.

Future bulletins will be issued to address the recovery and disposal of contaminated refrigerant.

Refrigerant: Technical Service Bulletins Contaminated R12 Refrigerant - Testing & Handling

FILE IN SECTION: 1 - HVAC

BULLETIN NO.: 53-12-05

DATE: May, 1995

SUBJECT: Contaminated R12 Refrigerant Testing and Handling

MODELS: 1994 and Prior Passenger Cars and Trucks with R12 A/C Systems

The J 39851 "PureGuard" R12 refrigerant monitor was recently shipped to all GM dealers as an essential tool to test R12 refrigerant. Dealers are strongly urged to install this protective device on their ACR3 or other R12 recovery equipment immediately. The PureGuard is easily installed on any recovery cart (20 minutes), requires no recovery cart modifications, is fully automatic (no training required) and does not increase the time required to perform normal A/C service procedures. Proper use of this tool can:

^ Prevent damage to your R12 recovery/recycling equipment.

^ Prevent contamination of previously recovered R12 in the recovery tank.

^ Prevent loss of your recovered R12 as contaminated refrigerant will activate automatic air purge system.

^ Prevent the spread of contaminated R12 to other vehicles you service.

If your dealership has multiple R12 recovery stations which are not protected, use the PureGuard to check the refrigerant in these recovery tanks for contamination at least once each week. Simply connect the PureGuard blue service hose (that would normally be connected to the vehicle low side service port) to the red or vapor side of any recovery cart tank and run the test. It is also important to check a tank containing recovered/recycled material for purity before installation on your charging equipment. Even new R12 refrigerant purchased from sources other than GM should be tested for contamination prior to use.

Sources of Contaminated R12 Refrigerant

Since refrigerant testing has not been a standard practice in the mobile A/C repair industry, the amount of R12 refrigerant contamination is unknown. As R12 prices rise and supplies are depleted, it is anticipated that contaminated R12 refrigerant may become more prevalent from the following as well as other sources:

^ The use of R12 refrigerant substitutes without installation of unique service fittings and proper identification labeling.

^ Improper use of R12 substitutes, such as topping off R12 systems with R134a or other refrigerants available to "do-it-yourselfers".

^ Poor quality or contaminated new or reprocessed R12 refrigerant.

R12 can and should continue to be used to service vehicles built with R12 as long as it is available. Combining any refrigerant with R12 results in a refrigerant mixture which cannot be used in an A/C system.

R134a is the only substitute refrigerant approved by GM and should only be used when the appropriate retrofit service bulletin procedures are explicitly followed. Use of any other substitute refrigerant requires the purchase of additional dedicated recovery, recycling (if applicable) and charging equipment to service each substitute refrigerant used.

However, you should know that the Environmental Protection Agency (EPA) has listed several products as acceptable replacements for R12 mobile A/C systems under the Significant New Alternatives Policy (SNAP). Some of these products are: R134a, R401c (a DuPont refrigerant blend) and FRIGC (another refrigerant blend). It is important to understand that the SNAP program only considers the health, safety and environmental characteristics of a chemical. It does not test for A/C system cooling performance or durability. That judgment is deferred to the vehicle manufacturer. Use of any R12 refrigerant substitute without dedicated service equipment, unique fittings, labels and refrigerant testing prior to recovery, could result in contamination of the R12 supply and the loss of the R12 recycling program.

What To Do When Contamination is Detected

Repeat the test to verify contaminated refrigerant is present. Clear the PureGuard following the instructions listed on the face panel, then perform a second test to verify that the vehicle A/C system contains contaminated or mixed refrigerant.

Contact the vehicle owner to advise that previous A/C system repairs were apparently performed with an R12 refrigerant substitute. Suggest the owner

contact or return to the previous repair facility. Explain that environmental regulations prohibit repair facilities from discharging ozone depleting A/C refrigerants into the atmosphere. Explain that recovery of this unknown refrigerant could damage your service equipment.

If the customer wishes to pursue repairs through your facility, it is recommended that the proper A/C service equipment be purchased. General Motors recommends the Kent-Moore J 41428 "Scavenger", an air operated refrigerant recovery station, be used to remove unknown refrigerants. The air operated feature reduces the hazard of recovering potentially flammable refrigerants. Dealers should evaluate the need to purchase the equipment based on the number of contaminated vehicles they encounter.

As an alternative to the initial purchase of a recovery only station, dealers should check locally for A/C specialty shops which may have the equipment to service substitute or contaminated refrigerants. They may be able to provide contaminated refrigerant recovery service to the dealer.

The GM Service Technology Group has tested a recovery procedure where a 15 or 30 pound DOT approved refillable tank is fully evacuated then connected to a vehicle A/C system to recover the charge. Testing has shown that even when the recovery tank is cooled down in dry ice, the procedure does not guarantee the entire charge will be recovered. Since EPA regulations require full recovery of ozone depleting substances, GM does not recommend this procedure.

Contaminated Refrigerant Disposal

Although A/C refrigerant testing and disposal have not been a service practice in the mobile A/C industry, It has been common in the stationary A/C service industry for many years. Listed at the end of this bulletin are companies that provide refrigerant disposal service for the stationary A/C industry. Please be advised that GM has not independently evaluated these companies and is not in any way endorsing or promoting the use of these companies. Each of these companies has expressed an interest in providing refrigerant disposal service to GM dealers.

In working with the stationary A/C industry, these companies typically receive large volumes of different refrigerants that have been mixed together. Unfortunately, because the volume of material returned by the mobile A/C industry will be in much smaller quantities, the cost of handling will be greater.

To arrange for return of the refrigerant, simply call the company nearest you using the phone number listed below. The company will advise you on billing and shipping procedures. Disposal cost will vary between $3.00 and $5.00 per pound plus freight and handling. Shipping charges will vary by distance and location. In general, a 7 to 10 day turn-around time on the tank can be expected. The tank can be shipped via common carrier. Documents that your refrigerant has been properly disposed of will be sent to you with the return of your tank.

As an alternative, many dealerships already have contracts in place with a disposal company who manages their hazardous wastes. In these cases, the disposal service may agree to handle containers of mixed refrigerants. Initially, the local disposal companies may be surprised by this inquiry. They may want to evaluate how much material will be collected before deciding whether to provide this service.

As we move forward with the practice of testing R12 refrigerant, it will take time for all the questions to be answered. STG will provide additional information as soon as it is available.

Understanding The PureGuard

The PureGuard is a highly sensitive instrument capable of detecting R12 with 3% or less cross-contamination with other refrigerants. Any refrigerant mixture in excess of this amount poses a threat to both your refrigerant supply and recovery equipment. The PureGuard uses a pass/fail approach when monitoring the refrigerant and is precisely calibrated to cut power to the recovery machine if it encounters R12 mixed with any substitute refrigerants. The PureGuard ignores the

presence of the air, dyes or oils in the refrigerant sampled.

At least 20 psi must be present in the vehicle's A/C system for the PureGuard to function. Otherwise, refrigerant cannot be introduced to the PureGuard's test chamber. If a vehicle's A/C system contains less than 20 psi, it is an indication that the vehicle's system is nearly depleted of refrigerant.

Occasionally, erratic PureGuard operation or service code 002 display will be encountered when A/C system pressure is exactly 20 psi. If this occurs, simply cycle the on/off switch to reset the PureGuard. After the 30 second PureGuard warm-up cycle, proceed immediately with vehicle recovery operation.

Feedback from the field has indicated PureGuard service code 002 will also be displayed if the oil drain port is not sealed. Make sure the "0" ring seal in the cap is in place and that the cap is tight.

If the PureGuard fails to clear or if you experience any other problems operating the PureGuard, contact Kent-Moore Technical Service at 1-800-345-2233. The unit should not be returned without first contacting Kent-Moore to obtain return authorization.

Refrigerant Disposal Locations:

United States Refrigerant Reclamation Inc. 12420 North Green River Rd. Evansville, IN 47711
800-207-5931, FAX - 812-867-1463

Omega Refrigerant Reclamation 5263 North Fourth St. Irwindale, CA 91706 310-698-0991, FAX - 310-696-1908

Refrigerant Management Svcs of Georgia 216 F. Atlanta Hwy. Cumming, GA 30130 Ph/FAX - 800-347-5872

Refrigerant Reclaim Inc. 122 Old Stage Coach Rd. Dumfries, VA 22026 800-238-5902, FAX - 703-441-0393

Gartech Refrigerant Reclamation Ctr. 2002 Platinum Garland, TX 75042 214-272-4070, FAX - 214-272-8548

National Refrigerants, Inc. 11401 Roosevelt Blvd. Philadelphia, PA 19154 215-698-6620, FAX - 215-602-8205

CFC Reclamation 1321 Swift North Kansas City, MO 64116 816-471-2511

Full Cycle-Global 550 James Street Lakewood, NJ 08701 908-370-3400, FAX - 908-370-3088

Refrigerant Reclaim Svcs, Inc. dba Full Cycle-Global 121 S. Norwood Drive Ft. Worth, TX 76053-7807 817-282-0022, FAX - 800-831-6182

Full Cycle-Global 2055 Silber, Ste. 109 Houston, TX 77055 713-681-7370, FAX - 713-681-9947

Full Cycle-Global 343 South Airline Hwy. Gonzales, LA 70737 504-644-5303, FAX - 504-644-1809

Full Cycle-Global 2966 Wireton Blue Island, IL 60406 708-388-8551, FAX - 708-388-8550

Refrigerant: Technical Service Bulletins A/C - Use of Alternate Refrigerants In CFC 12

Number: 92-250-1A

Section: 0A

Date: AUGUST 1992

Corporate Bulletin No.: 231205

ASE No.: A7

Subject: USE OF ALTERNATE REFRIGERANTS IN CFC 12 REFRIGERANT MOBILE AIR CONDITIONERS

Model and Year: GALL MODEL YEARS - ALL PASSENGER CARS AND TRUCKS INCLUDING GEO

A number of inquiries have been received concerning the use of "alternate refrigerants" as a replacement for R-12 refrigerant in General Motors air conditioning systems.

Regardless of any advertised claims, there are currently no substitutes for refrigerant R-12 approved by General Motors. At the present time, only new or recycled R-12 is approved for use in General Motors R-12 air conditioning systems.

Based on studies performed to date, the use of "alternate refrigerants" in General Motors R-12 air conditioning systems may result in higher system pressures, higher leak rates or incompatibility with drying and sealing materials. System performance and reliability may also be affected.

Service equipment manufacturers have indicated that cross-contaminating R-12 recovery/recycling equipment with "alternate refrigerants" may damage the equipment. General Motors supports the Society of Automotive Engineers recommended service procedures for recovery and recycling of R-12. The use of known "alternate refrigerants" without proper service practices for identifying vehicle systems containing these "alternate refrigerants" and dedicated recovery equipment to service those vehicles will contaminate the recycled supply of R-12 refrigerant. Contamination of the recycled R-12 refrigerant makes the refrigerant unusable for recharging air conditioning systems and could jeopardize the recycling program.

At the present time, General Motors has not approved any "alternate refrigerant" for R-12 in R-12 air conditioning systems. Therefore, R-12 systems should continue to be serviced with new or recycled R-12 only.

Refrigerant: Specifications Without Rear A/C

System ..... 3.00 lbs

Refrigerant: Specifications With Rear A/C

System ..... 4.50 lbs

Refrigerant Oil: Specifications With Front A/C Only

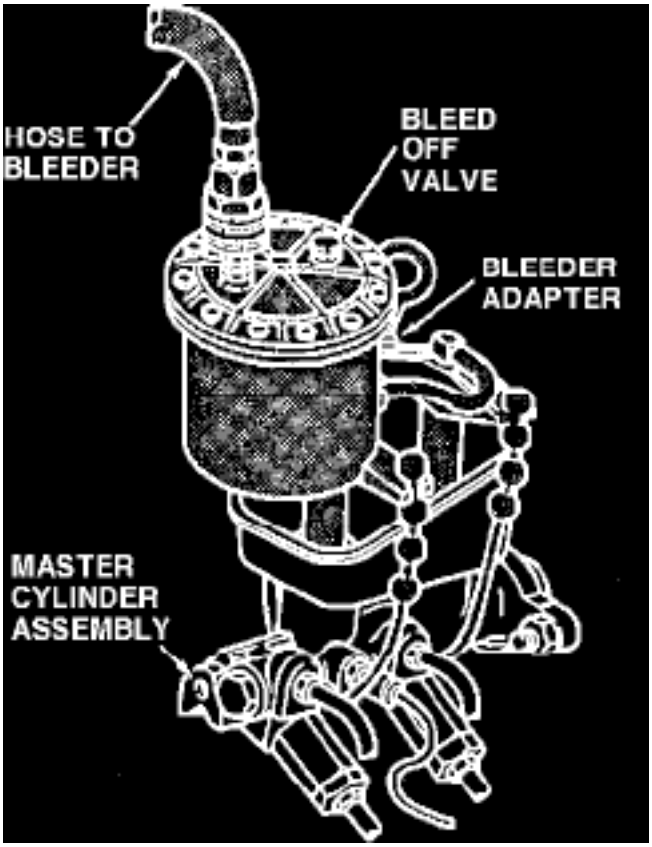
With A-6 Compressor ..... 10 oz

With R-4 Compressor ..... 6 oz

Refrigerant Oil: Specifications With Front & Rear A/C

With A-6 Compressor ..... 10 oz

With R-4 Compressor ..... 6 oz



Brake Bleeding: Service and Repair Hydraulic System Bleeding

Manual Bleeding

1. If vehicle is equipped with power brakes, remove vacuum reserve by applying brakes several times with engine off.

2. Fill master cylinder reservoirs with suitable brake fluid. Be sure to always keep master cylinder reservoirs at least half full during entire bleeding procedure.

3. If master cylinder is suspected to have air in the bore, it must be bled first, as follows: a.

Disconnect forward brake pipe connection at master cylinder.

b. Allow brake fluid to fill master cylinder bore until it begins to flow from forward pipe connector port.

c. Connect and tighten forward brake pipe at master cylinder.

d. Depress brake pedal slowly one time and hold, then loosen forward brake pipe connection at master cylinder to purge air from bore. Tighten connection, then release brake pedal slowly. Wait 15 seconds, then repeat sequence, including 15 second wait, until all air is purged from bore.

e. Bleed rear bore of master cylinder as front bore was bled.

4. Bleed right rear brake as follows: a.

Depress brake pedal slowly one time and hold.

b. Loosen bleeder valve to purge air from brake, then tighten bleeder valve and slowly release pedal.

c. Wait 15 seconds, then repeat sequence, including 15 second wait, until all air is purged.

5. Bleed left rear, right front, and left front brakes, in that order, using same method as for right rear brake.

6. Check brake operation and ensure pedal is firm. Also check master cylinder fluid level and add fluid as necessary.

7. Turn off brake warning light by applying moderate pressure to brake pedal several times.

8. Road test vehicle.

Fig. 1 Installing Pressure Bleeder Adapter

Pressure Bleeding

1. Loosen, then slightly retighten bleeder valves at all four wheels. Repair any broken, stripped or frozen valves at this time.

2. Using a diaphragm type pressure bleeder, install suitable bleeder adapter to master cylinder, Fig. 1.

3. Charge bleeder ball to 20-25 psi, then depress and hold valve stem on combination valve.

4. Connect pressure bleeder line to adapter.

5. Open line valve on pressure bleeder, then depress bleed-off valve on adapter until a small amount of brake fluid is released.

6. Raise and support vehicle.

7. Bleed right rear, left rear, right front and left front brakes, in that order.

8. Place transparent tube over bleeder valve, then allow tube to hang down into transparent container. Ensure end of tube is submerged in clean brake fluid.

9. Open bleeder valve 1/2 to 3/4 turn and allow fluid to flow into container until all air is purged from line.

Flushing Hydraulic System If brake fluid is old, rusty or contaminated, or whenever new parts are installed in the hydraulic system, the system must be flushed. Bleed brakes, allowing at least one quart of clean brake fluid to pass through system. Any rubber parts in hydraulic system which were exposed to contaminated fluid must be replaced.

Brake Bleeding: Service and Repair Master Cylinder Bleeding

THIS PROCEDURE CAN BE PERFORMED WITH MASTER CYLINDER ON OR OFF VEHICLE.

1. Disconnect brake lines at master cylinder, if necessary. 2. Connect suitable lengths of brake lines to master cylinder and immerse other ends of lines in master cylinder reservoirs. 3. Apply master cylinder pushrod or brake pedal with full strokes until air bubbles have disappeared in reservoirs. It may require 20-30 applications

to fully eliminate air bubbles.

4. Remove bleeding lines from master cylinder, then install master cylinder on vehicle, if necessary, and connect brake lines. 5. Fill the reservoir. Normal bleeding procedures should be followed after the master cylinder is installed.

For additional information see Bench Bleeding Notes. See: Brakes and Traction Control/Hydraulic System/Brake Master Cylinder/Fundamentals and Basics

Brake Bleeding: Fundamentals and Basics

BENCH BLEEDING

Why

A master-cylinder will develop little or no pressure if air is trapped in cylinder bore. Normal brake bleeding will not remove air trapped within the master-cylinder.

How

Clamp the master-cylinder securely in a vice. It is usually best to clamp the side of the vice onto the flat surface that is used to secure the master-cylinder to the brake booster.

There are two basic methods for bleeding master-cylinder, one utilizes stroking the master-cylinder to expel air from the cylinder bore while the other utilizes a large syringe to backflush fluid from the outlet ports to the reservoir.

Stroking -

Fill the master-cylinder with clean brake fluid.

- The brake line fittings on the master-cylinder should be capped or plugged.

NOTE: Special "bench bleeding" plastic fittings are available which allow for recirculating the brake fluid back into the reservoir.

- Using a dull object, slowly stroke the master-cylinder piston, air and brake fluid will be expelled from the brake line fittings. Prior to releasing the piston plug or cap the outlet ports.

- Repeat this procedure 8-10 times or until no air is emitted from the outlet ports.

- When finished, cap the outlet ports and install the master-cylinder.

Syringe -

Fill the syringe (one especially designed for brake bleeding) with clean brake fluid.

- Insert the end of the syringe into one of the outlet ports on the master-cylinder.

- Slowly compress the syringe and back flush the brake fluid through the master-cylinder.

- A combination of air and brake fluid will be emitted from the inlet port in the fluid reservoir.

- Repeat this procedure until only brake fluid is emitted into the reservoir.

-

Cap the outlet ports and install the master-cylinder.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Fuse: Technical Service Bulletins Electrical - Aftermarket Fuse Warning

Bulletin No.: 07-08-45-002

Date: September 05, 2007

ADVANCED SERVICE INFORMATION

Subject: Service Alert: Concerns With Aftermarket Fuses in GM Vehicles

Models: 2008 and Prior GM Passenger Cars and Light Duty Trucks (including Saturn) 2008 and Prior HUMMER H2, H3 2008 and Prior Saab 9-7X

Concerns with Harbor Freight Tools "Storehouse" Branded Blade Type Fuses

General Motors has become aware of a fuse recall by Harbor Freight Tools/Storehouse for a variety of aftermarket fuses. In two cases, these fuses have not provided protection for the wiring system of the vehicles they were customer installed in.

Upon testing the 15 amp version, it was found that the fuse still would not "open" when shorted directly across the battery terminals.

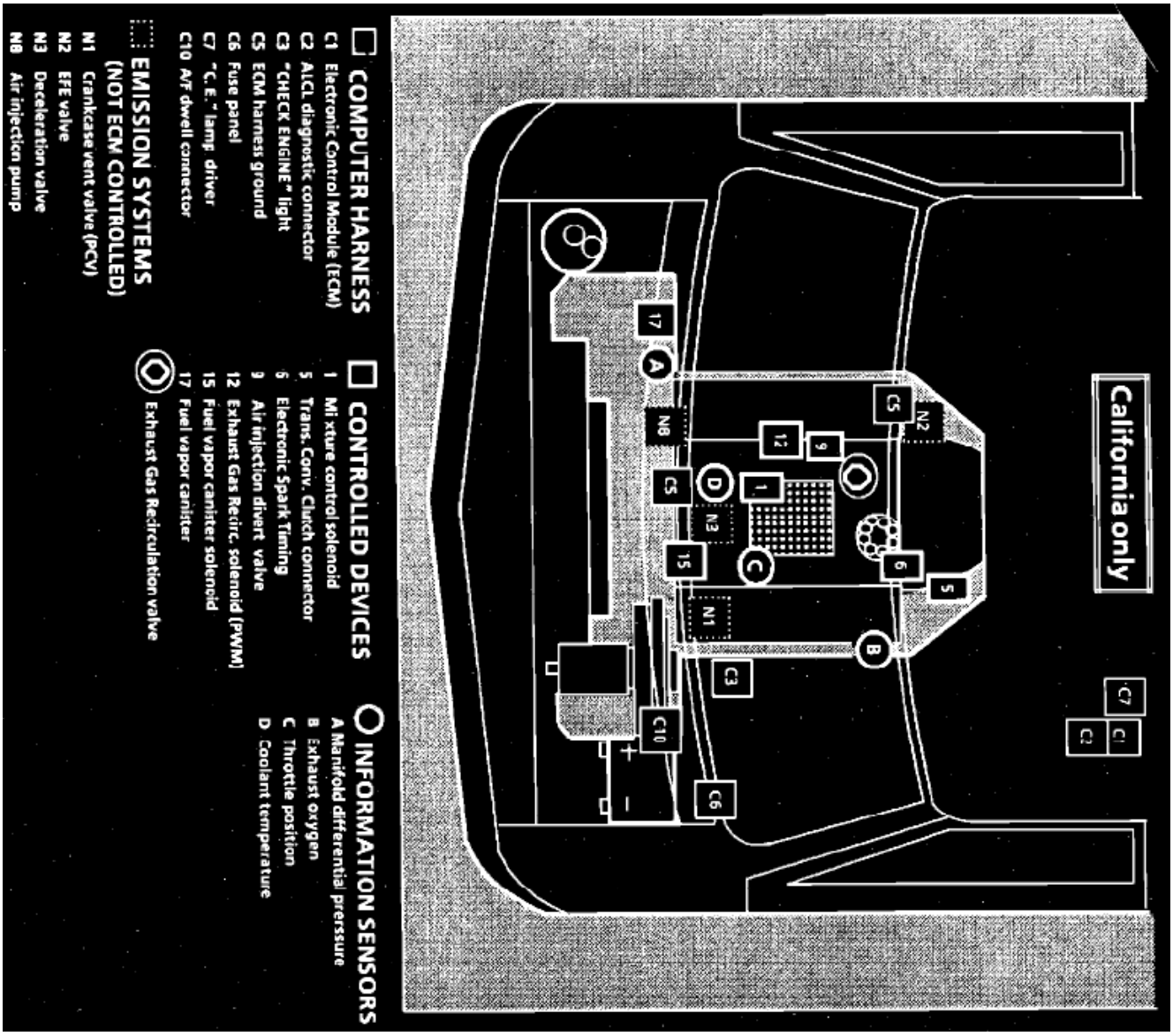
How to Identify These Fuses

Packed in a 120 piece set, the fuse has a translucent, hard plastic, blue body with the amperage stamped into the top. There are no white painted numbers on the fuse to indicate amperage. There are no identifying marks on the fuse to tell who is making it. The fuses are known to be distributed by Harbor Freight Tools but there may be other marketers, and packaging of this style of fuse. It would be prudent to replace these fuses if found in a customers vehicle. Likewise, if wiring overheating is found you should check the fuse panel for the presence of this style of fuse.

All GM dealers should use genuine GM fuses on the vehicles they service. You should also encourage the use of GM fuses to your customers to assure they are getting the required electrical system protection. GM has no knowledge of any concerns with other aftermarket fuses. If additional information becomes available, this bulletin will be updated.

Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Fuses and Circuit Breakers > Fuse Block > Component Information > Locations > California

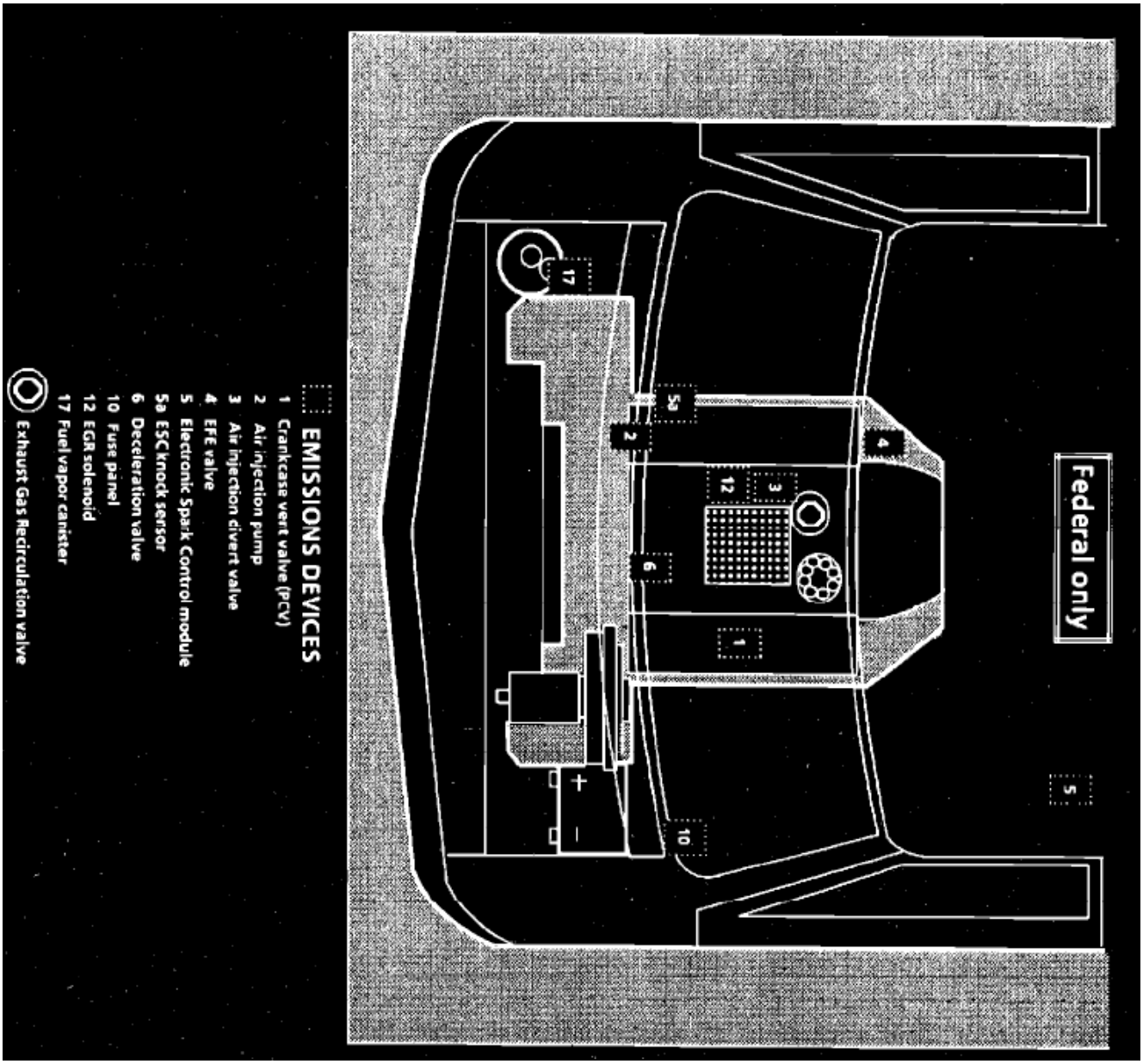


Fuse Block: Locations California

Underhood & Engine Components.

Under I/P

Applicable to: 1985 G Series w/5.0L & 5.7L California

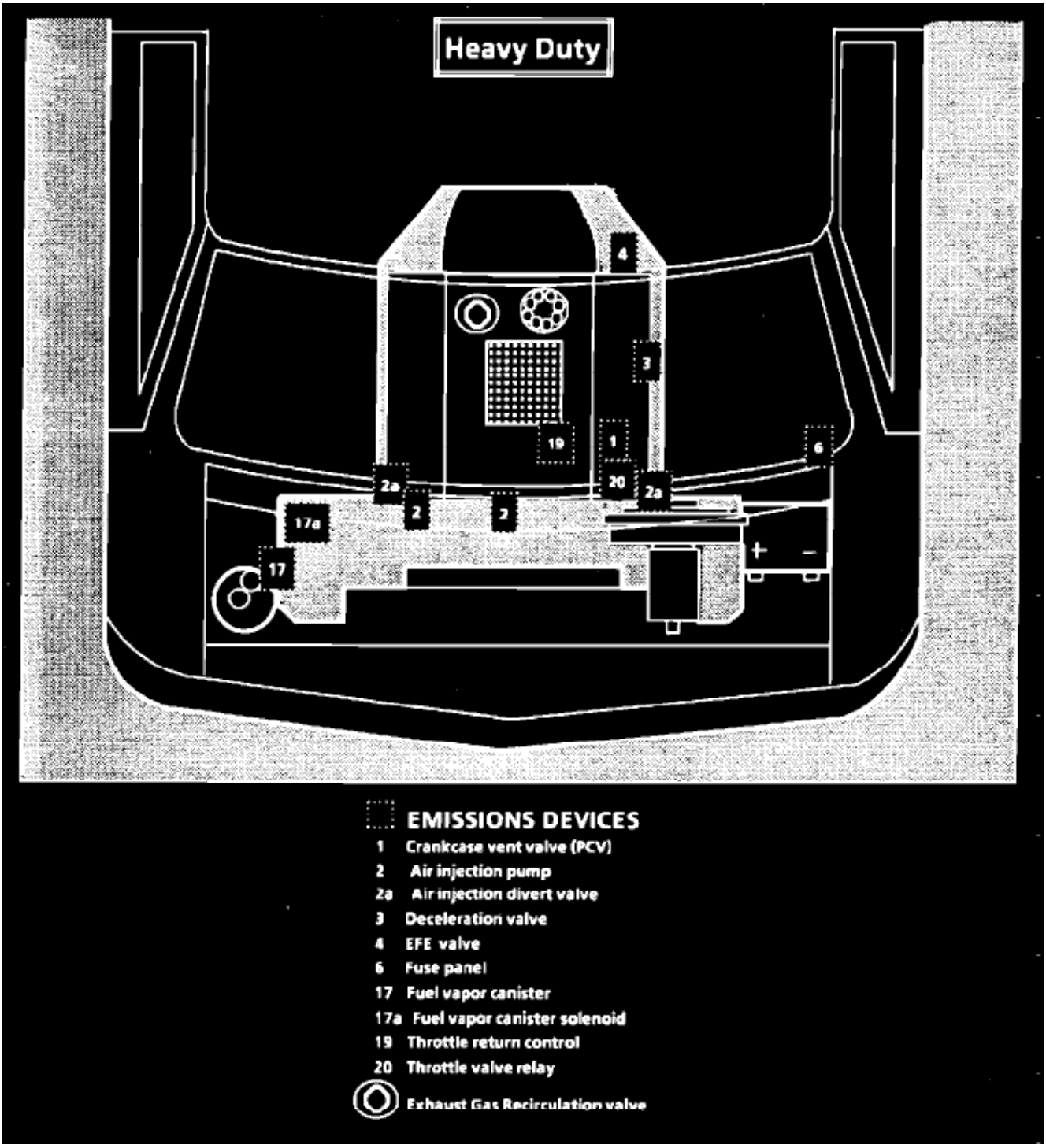


Fuse Block: Locations Except California

Underhood & Engine Components.

Under I/P

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

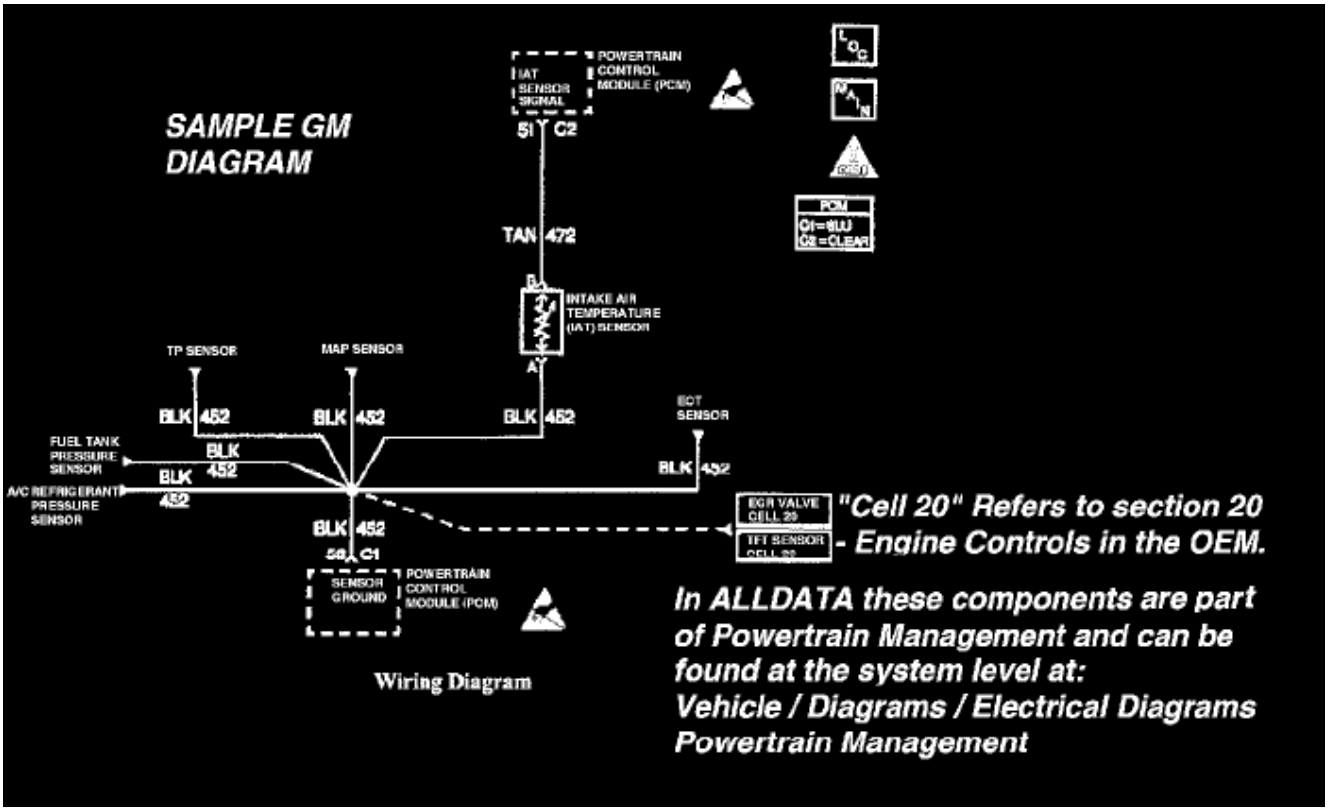


Fuse Block: Locations Heavy Duty Emissions

Underhood & Engine Components

Under I/P

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions



Fuse Block: Diagram Information and Instructions

CELL REFERENCES

General Motors vehicles often use "CELL" references in their electrical wiring diagrams. These references are used in the Original Equipment Manual to refer to a section in the manual and not a specific diagram(s).

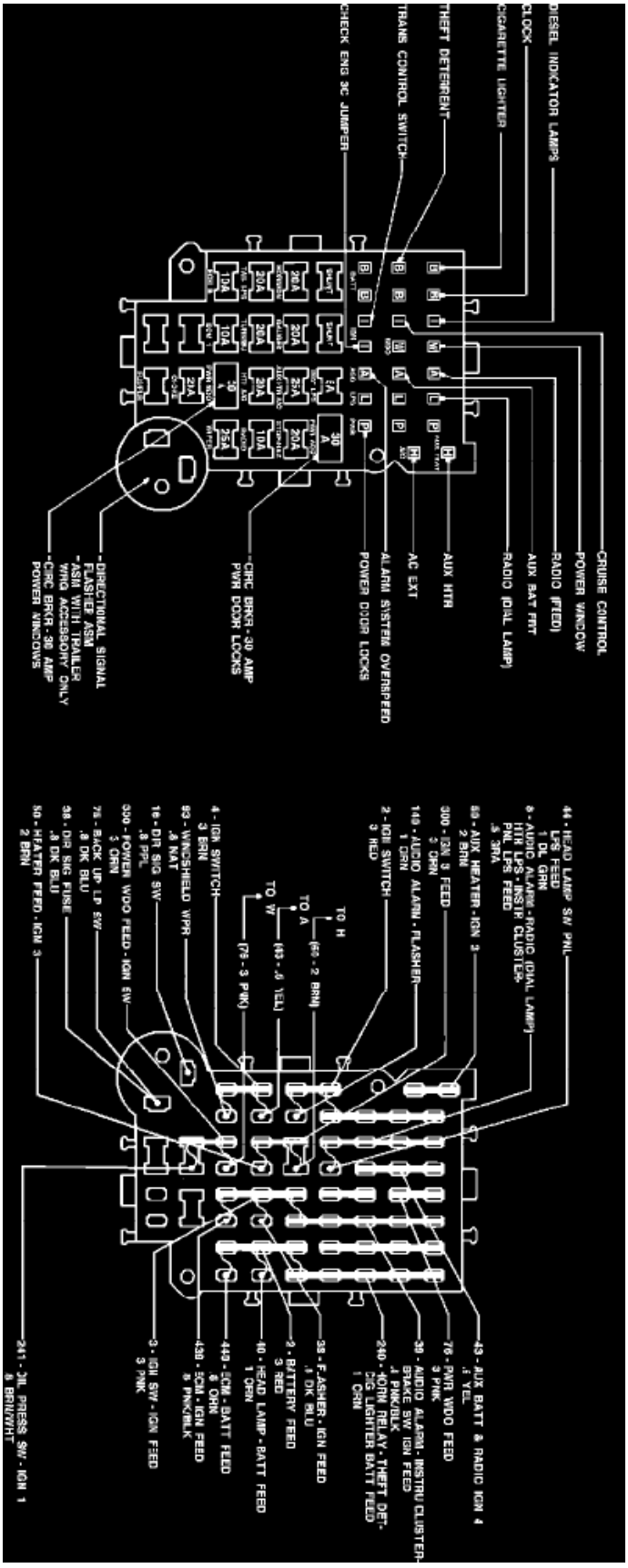
GM Sample Diagram W/ Cell Reference

For instance, in the diagram illustrated "Cell 20" is not a reference to another diagram but a reference to "Section 20" in the OE manual. In the example, "Section 20" is the engine control section of the manual.

To navigate through these "Cell" references start at the vehicle level and go to: Diagrams / Electrical Diagrams - for a complete list of the diagrams available for the vehicle. Choose the system you are working on and view those diagrams.

Note: If unsure of the system - try utilizing the search feature. Type a component in the search feature that belongs to the system and when the results are displayed note the path displayed. This will show the system the component belongs in.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Fuses and Circuit Breakers > Fuse Block > Component Information > Diagrams > Diagram Information and Instructions > Page 836



Fuse Panel (Part 2 of 2)

Coolant Level Indicator Lamp: Service and Repair

This lamp will be illuminated when engine coolant level in the radiator drops below a pre-determined level. To turn lamp "OFF," check cooling system, then add coolant to bring system to proper level.

Maintenance Indicator - A/T: Technical Service Bulletins A/T Fluid Level Indicator - Available

Number: 90-406-7A

Section: 7A

Date: March 1991

Corporate Bulletin No.: 067107

Subject: AVAILABILITY/SERVICING OF NEW TRANSMISSION FLUID LEVEL INDICATOR

Model and Year: 1982-90 C/K TRUCKS, 1987-90 R/V TRUCKS, 1983-90 G VANS WITH 3L80 OR 4L60 AUTOMATIC TRANSMISSION

A new transmission fluid level indicator featuring a seal at the transmission fill tube inlet end is available. This indicator, which is installed on all 1991 C/K, R/V and G models, may be installed on previous models listed below.

SERVICE PROCEDURE:

When installing a new transmission fluid level indicator, replacement of the transmission fluid fill tube is not necessary.

SERVICE PARTS INFORMATION

Part Number Model Description

15659455 1982-90 C/K All & Transmission fluid

3L80 or 4L60 level indicator

15659455 1987-90 RN All & Transmission fluid

3L80 or 4L60 level indicator

15677051 1987-90 G All w/(4.3Z, 5.0H, 5.7K) Transmission fluid

& 4L60 level indicator

15677052 1987-90 G2 (6.2C) & 4L60 Transmission fluid

1983-86 G All & 4L60 level indicator

15677055 1987-90 G3 (6.2J) & 3L80 Transmission fluid

1987-88 G3 (5.7M) & 3L80 level indicator

1984-86 G All & 3L80 1983 G3 & 3L80

15677056 1987-90 G All w/(4.3Z, 5.0H, 5.7K) Transmission fluid

& 3L80 level indicator

15677057 1988-90 G3 (7.4N) & 3L80 Transmission fluid level indicator

Parts are currently available from GMSPO.

WARRANTY INFORMATION

For vehicles repaired under warranty use:

Labor Operation: K6130

Use applicable Labor Time Guide for labor hours.

Malfunction Indicator Lamp: Description and Operation

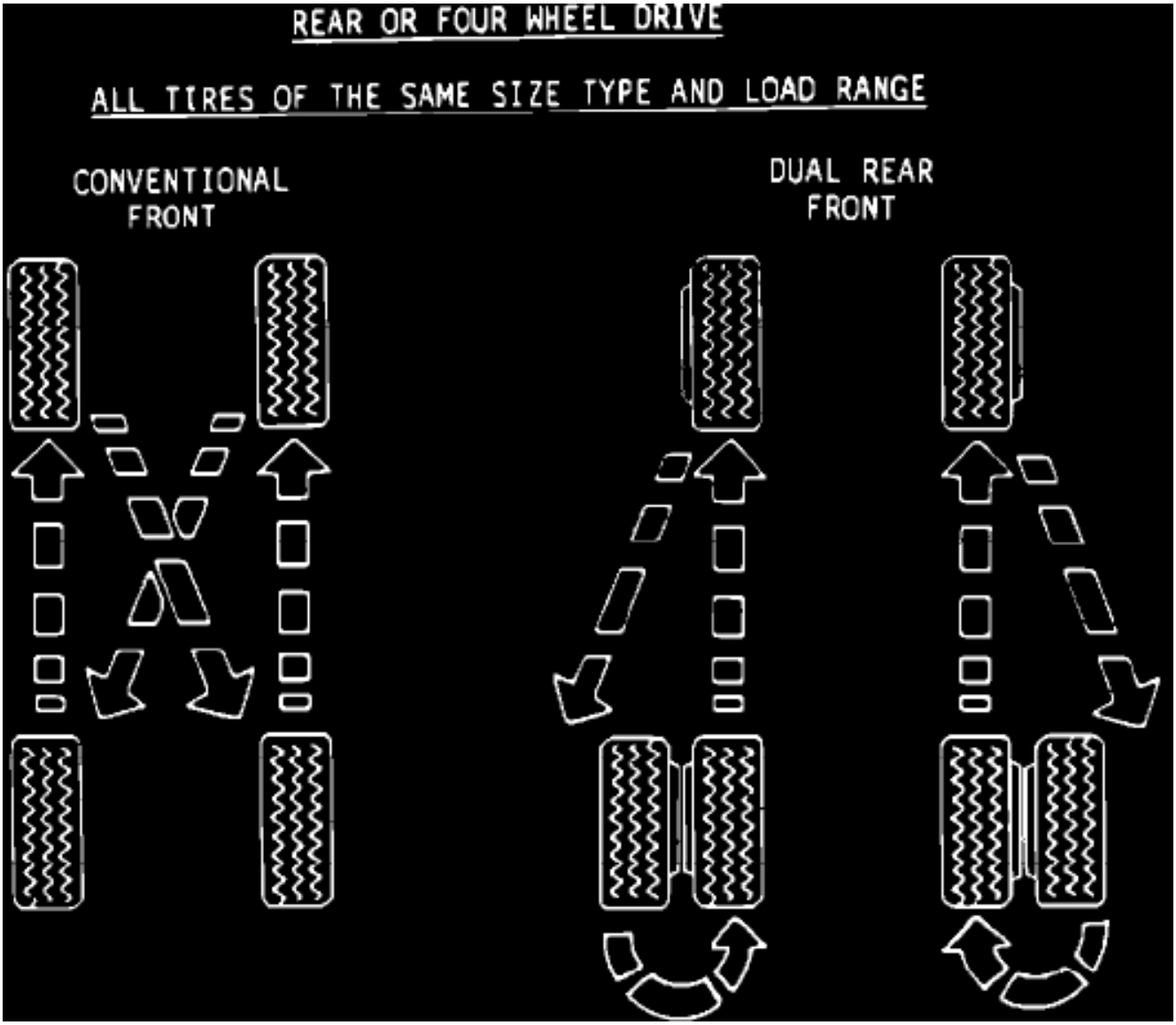
The instrument panel mounted ``Check Engine'' lamp is used to alert the operator of malfunctions within the C3 system. When the ignition is on with the engine stopped, the lamp is illuminated as a bulb check. When the engine is running, the lamp will be illuminated whenever the ECM senses a system malfunction. In addition, the lamp is used to access trouble codes stored in the ECM trouble code memory.

Malfunction Indicator Lamp: Service and Repair

The Check Engine Lamp will be illuminated when the ignition switch is placed in the On position. When the engine is started, the lamp should go off. If the lamp remains on for 10 seconds or constantly after the engine is started, the self diagnosis system has detected a problem and has stored a code in the system Electronic Control Module (ECM). After diagnosis and repair, the ECM memory can be cleared of codes by removing the ECM fuse or disconnecting the battery ground cable for approximately 30 seconds, with ignition switch in the Off position. It should be noted, that if battery ground cable is disconnected to clear codes, components such as clocks, electronically tuned radios etc., will have to be reset.

Oil Level Warning Indicator: Description and Operation

On models less gauges, the oil/choke warning indicator lamp should be illuminated when the ignition switch is in the Run or Start position. When the engine is started, the choke warning indicator lamp should go off. If the lamp fails to illuminate with ignition switch in Run or Start position with engine not operating, a burnt out bulb or fuse or defect in choke electrical system is indicated. If lamp remains on after engine has been started, a problem in the engine oil pressure system or electrical choke system exist. On models equipped with gauges, the choke warning indicator lamp should be illuminated when the ignition switch is in the Run or Start position. When the engine is started, the choke warning indicator lamp should go off. If fails to illuminate with ignition switch in Run or Start position with engine not operating, a burnt out bulb or fuse or defect in choke electrical system is indicated. If lamp remains on after engine has been started, a problem in the alternator circuit is indicated. After service has been completed, the lamp operation should return to normal.



Tires: Customer Interest Tires (Front) - Irregular Wear

Number: 91-26-3E

Section: 3E

Date: June 1990

Corp. Bulletin No: 053501 Subject:

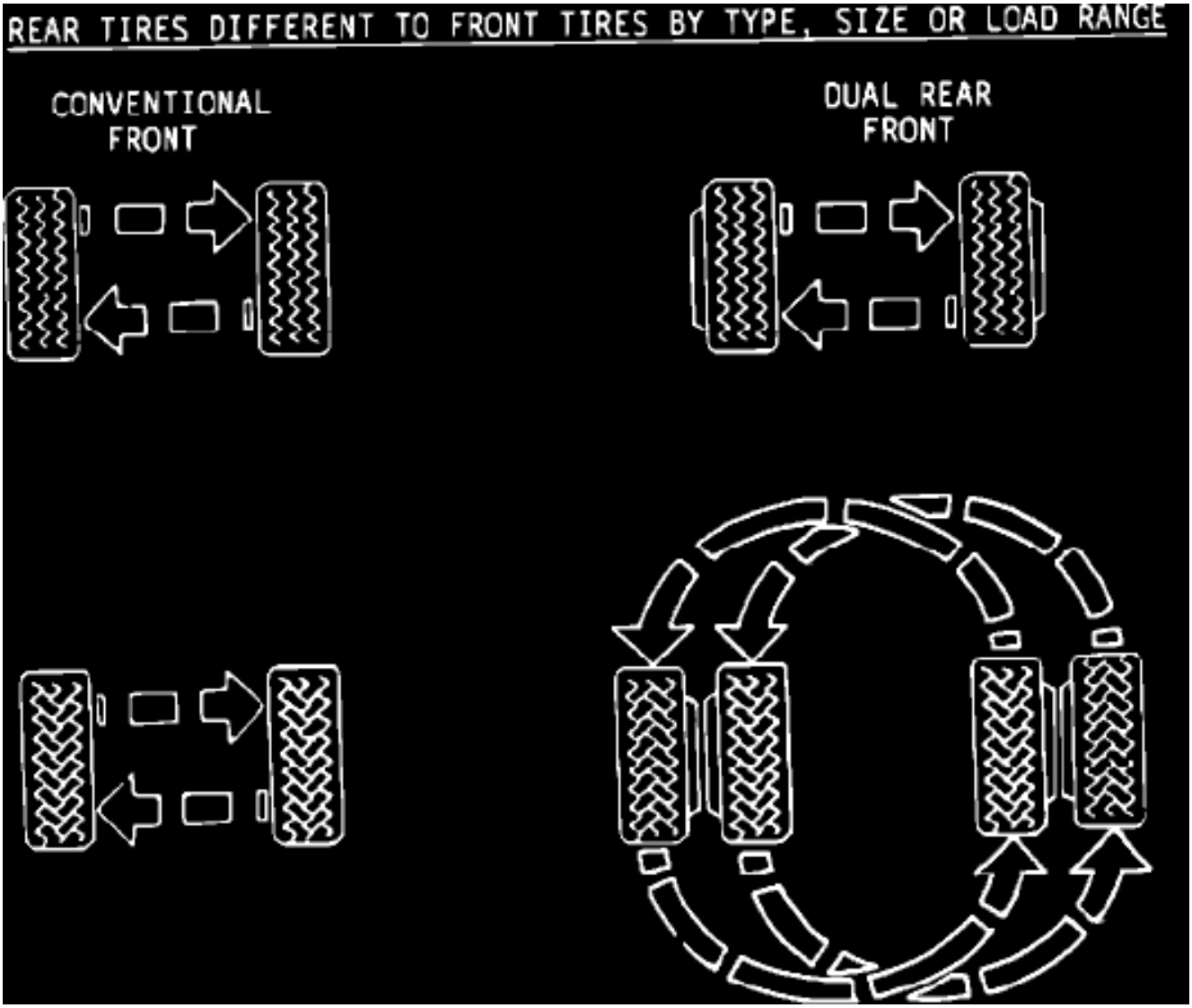
FRONT TIRE WEAR

Model and Year: 1982-91 LIGHT DUTY TRUCKS (REAR WHEEL DRIVE)

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 91-12-3E. THE KILOMETERS HAVE BEEN TRANSLATED INTO MILES. ALL COPIES OF 91-12-3E SHOULD BE DISCARDED.

Rear wheel drive trucks, equipped with All Season and/or On-Off road tires may exhibit irregular wear of; the front tires. Small amounts of irregular wear is considered normal and is not necessarily a result of incorrect alignment. Incorrect alignment (especially toe) may result in premature wear of the front tires, however agressive cornering may also have a similar effect. Drive axle tires are much less prone to irregular wear, therefore they should not be considered for comparison of wear to non-drive axle tires.

The rate of irregular wear is also dependent upon the depth of tread. New tires are more prone to irregular wear, so it is essential that tires are rotated at the proper intervals to normalize the wear.

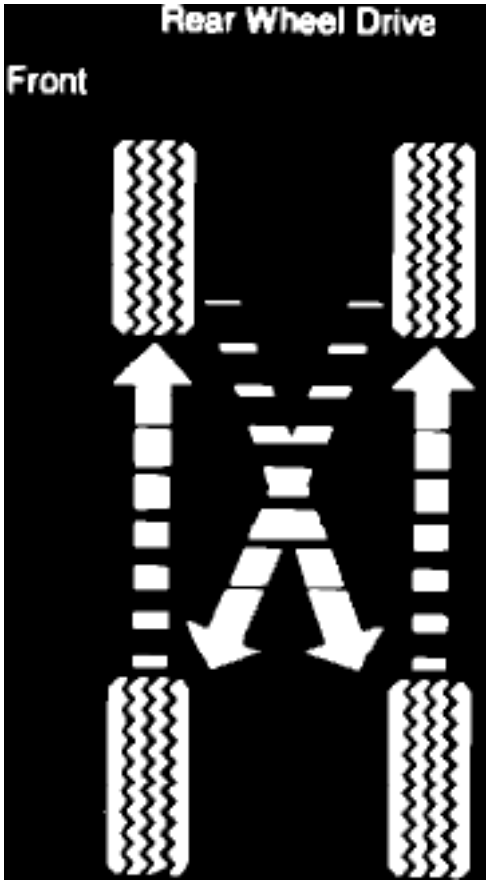


Light Duty truck tire rotation recommendations are pictured on the following page.

Rotation Guidelines for Tires used on Light Duty Trucks:

Tires used on Pickups, Vans and Utility vehicles should be rotated at the first 6,000 miles for Schedule 1 or 7,500 miles for Schedule 2 and then every 15,000 miles thereafter.

NOTE: Earlier rotation may be required should irregular wear pafterns develop due to harsh service use - the following rotation patterns are recommended for the various vehicle types and tire combinations.



Tires: Customer Interest Tires, Front - Premature Wear on RWD Vehicles

86-13 3 DEC., 1985

Subject: FRONT POSITION TIRE WEAR ON REAR WHEEL DRIVE VEHICLES, AND ALL WEATHER TIRES

Model and Year: ALL REAR WHEEL DRIVE VEHICLES PASSENGER CARS AND LIGHT DUTY TRUCKS TO:

ALL CHEVROLET DEALERS

Some rear wheel drive vehicles may exhibit premature tire wear on the front wheel positions. The wear usually starts on the outer tread row and may progress across the full tread. This wear also usually appears as a heel and toe (high and low) wear pattern on individual tread blocks which can eventually lead to tire noise and/or tire roughness.

Rear Wheel Drive

Small amounts of heel/toe wear on the outer tread is considered normal. This wear is characteristic of new tires at full tread depth on free-rolling axles. Turning and cornering exaggerates front tire wear. Routine tire rotation at 7,500 miles using the modified 'X' method* as shown in the Owners Manual will minimize the wear. Such tires can be expected to give optimum performance for their full intended life.

If this type of wear becomes excessive and/or results in a customer inquiry, the following procedure should be followed:

1) Rotate tires using the modified 'X' pattern* shown. This allows the front tires to rotate in the opposite direction on the rear of the vehicle which will tend to even out any irregular wear quicker. It also allows all four tires to eventually run on all four positions. Tire noise may continue after rotation, but should gradually lessen after a few thousand miles.

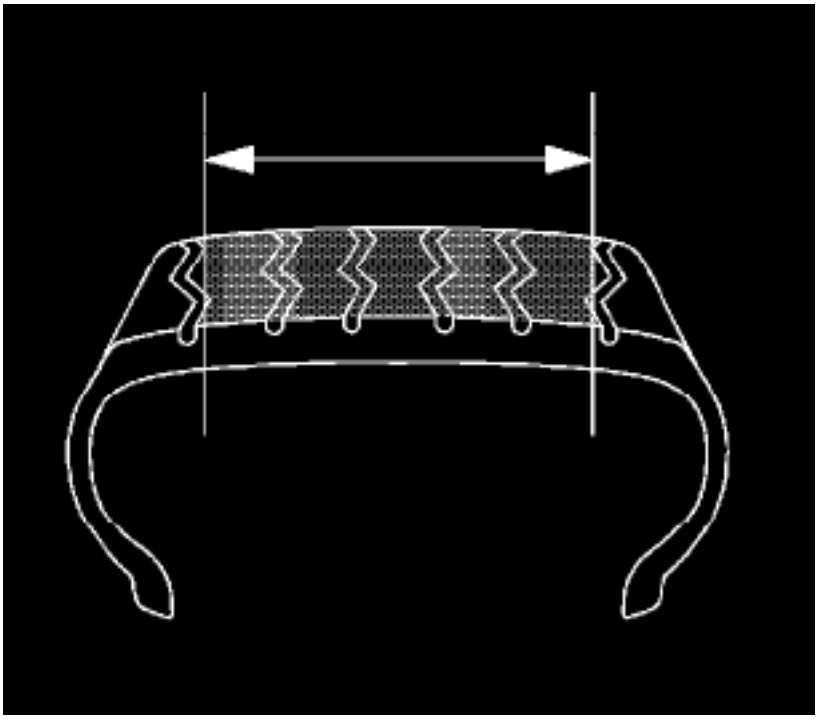
2) Measure front alignment. The single most contributing cause of premature tire wear, except for abusive driving, is excessive toe. For best tire wear, reset toe as close to zero as the specification allows. In most cases, this will be .1~ total toe or less. Camber and caster should also be set to specification if necessary.

3) Talk to the customer about his/her tires. Explain that some amount of shoulder wear on front tires is normal and will even out with regular tire rotation. Explain that front tire shoulder wear is also exagger-

ated by hard cornering. Stress the importance of proper inflation pressure and alignment.

4. If the wear has advanced far enough, tire replacement may become necessary. When installing new tires, match the tire's high point mark to the wheel's valve and then balance. Also, alignment must be reset as specified in Step 2 above and the customer instructed to follow the modified 'X' rotation schedule at 7,500 miles.

*The modified 'X' rotation pattern does not apply to some models, such as Corvettes, Camaros, and Firebirds equipped with directional tires and/or special wheels.



Tires: All Technical Service Bulletins Tires/Wheels - Tire Puncture Repair Procedures

INFORMATION

Bulletin No.: 04-03-10-001F

Date: April 27, 2010

Subject: Tire Puncture Repair Procedures For All Cars and Light Duty Trucks

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks (including Saturn) 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X

Supercede: This bulletin is being revised to add model years. Please discard Corporate Bulletin Number 04-03-10-001E (Section 03 - Suspension).

This bulletin covers puncture repair procedures for passenger car and light duty truck radial tires in the tread area only. The tire manufacturer must be contacted for its individual repair policy and whether or not the speed rating is retained after repair.

Caution

- Tire changing can be dangerous and should be done by trained professionals using proper tools and procedures. Always read and understand any manufacturer's warnings contained in their customers literature or molded into the tire sidewall.

- Serious eye and ear injury may result from not wearing adequate eye and ear protection while repairing tires.

- NEVER inflate beyond 275 kPa (40 pounds) pressure to seat beads.

Some run flat tires, such as the Goodyear Extended Mobility Tire (EMT) used on the Corvette, may require more than 275 kPa (40 psi) to seat the bead. In such a case, a tire safety cage must be used. Consult the tire manufacturer for its individual repair policy.

- NEVER stand, lean or reach over the assembly during inflation.

Repairable area on a radial tire.

Important

- NEVER repair tires worn to the tread indicators 1.59 mm (2/32") remaining depth).

- NEVER repair tires with a tread puncture larger than 6.35 mm (1/4").

- NEVER substitute an inner tube for a permissible or non-permissible repair.

- NEVER perform an outside-in tire repair (plug only, on the wheel).

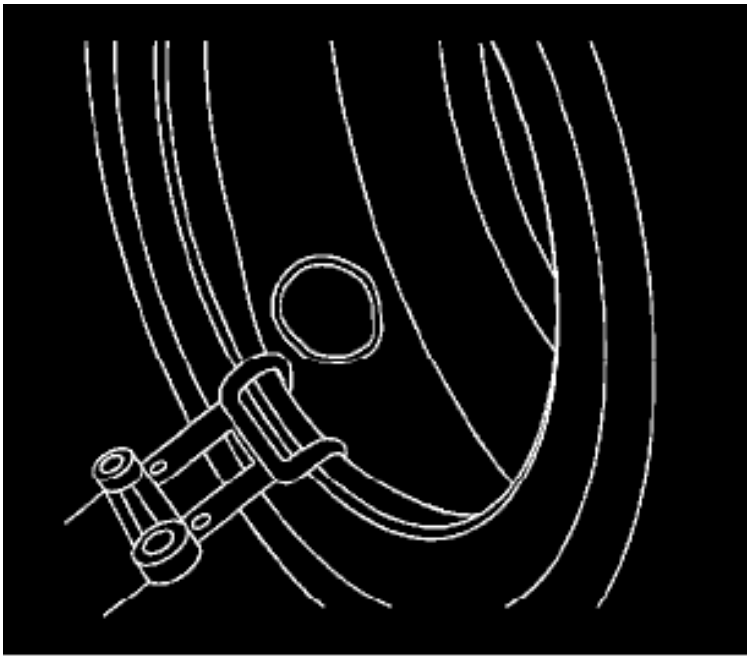
- Every tire must be removed from the wheel for proper inspection and repair.

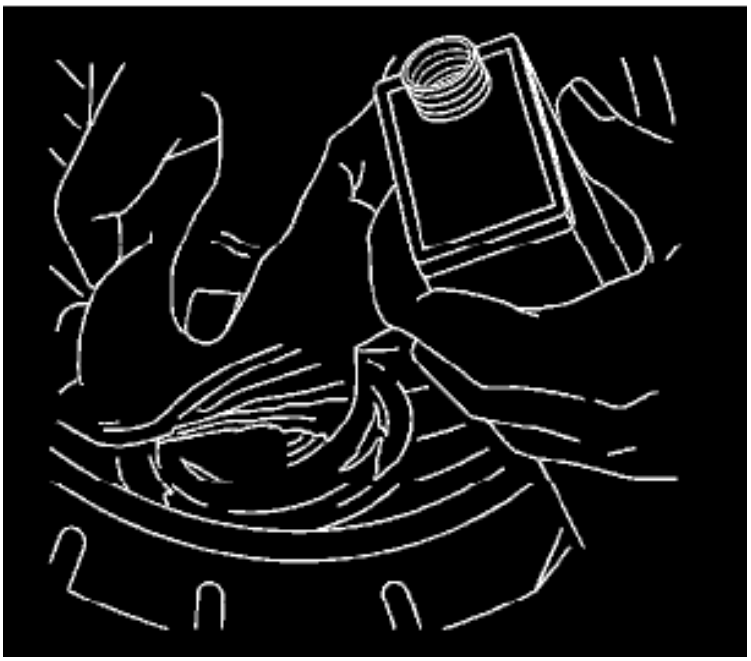
- Regardless of the type of repair used, the repair must seal the inner liner and fill the injury.

- Consult with repair material supplier/manufacturer for repair unit application procedures and repair tools/repair material recommendations.

Three basic steps for tire puncture repair:

1. Remove the tire from the wheel for inspection and repair.





2. Fill the injury (puncture) to keep moisture out. 3. Seal the inner liner with a repair unit to prevent air loss.

External Inspection

1. Prior to demounting, inspect the tire surface, the valve and the wheel for the source of the leak by using a water and soap solution. Mark the

injured area and totally deflate the tire by removing the valve core.

2. Demount the tire from the wheel and place the tire on a well-lighted spreader.

Internal Inspection

1. Spread the beads and mark the puncture with a tire crayon. 2. Inspect the inner tire for any signs of internal damage. 3. Remove the puncturing object, noting the direction of the penetration. 4. Probe the injury with a blunt awl in order to determine the extent and direction of the injury. 5. Remove any loose foreign material from the injury. 6. Punctures exceeding 6.35 mm (1/4") should not be repaired.

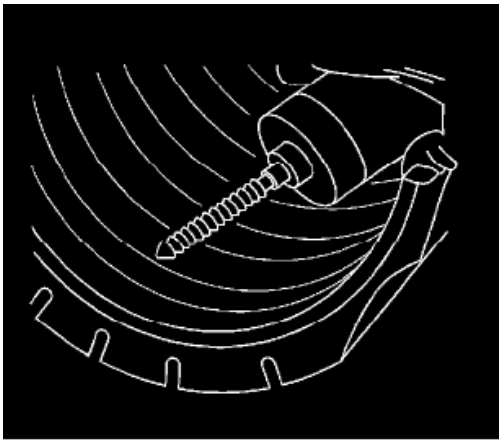
Cleaning

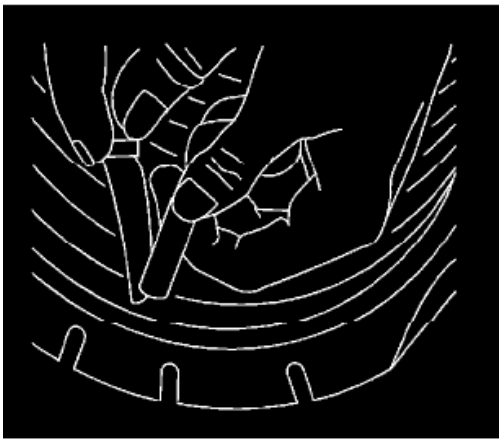
1. Clean the area around the puncture thoroughly with a proper liner cleaner, clean cloth and a scraper. This step serves to remove dirt and mold

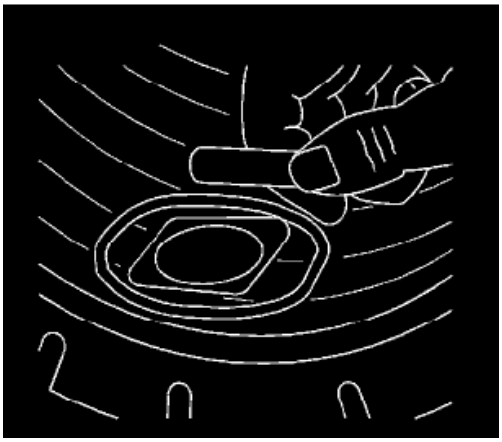
lubricants to insure proper adhesion and non-contamination of the buffing tool.

2. Refer to information on the product or manufacturer's Material Safety Data Sheet and follow guidelines for handling and disposal.

Clean the Injury Channel







1. Use a proper hand reamer, carbide cutter or drill bit to ream the puncture channel from the inside of the tire in order to clean the injury. 2. Remove steel wires protruding above the liner surface to

prevent damage to the repair unit. 3. Consult your repair material supplier for recommended reaming tool(s).

Fill the Injury

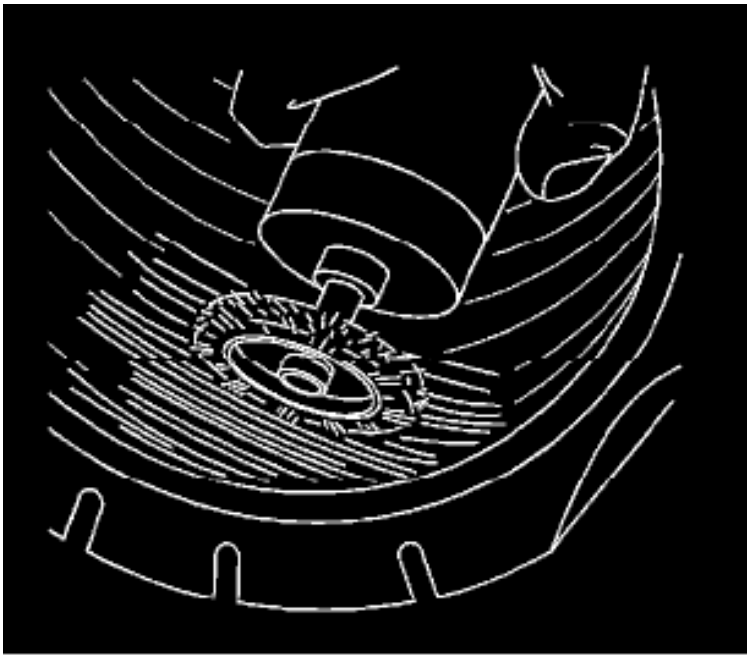
1. It is necessary to fill the injury channel to provide back up for the repair unit and to prevent moisture from entering the tire fabric and steel wires. 2. (For combination repair/plug units skip this step.) Cement the injured channel and fill the injury from the inside of the tire with the repair plug per

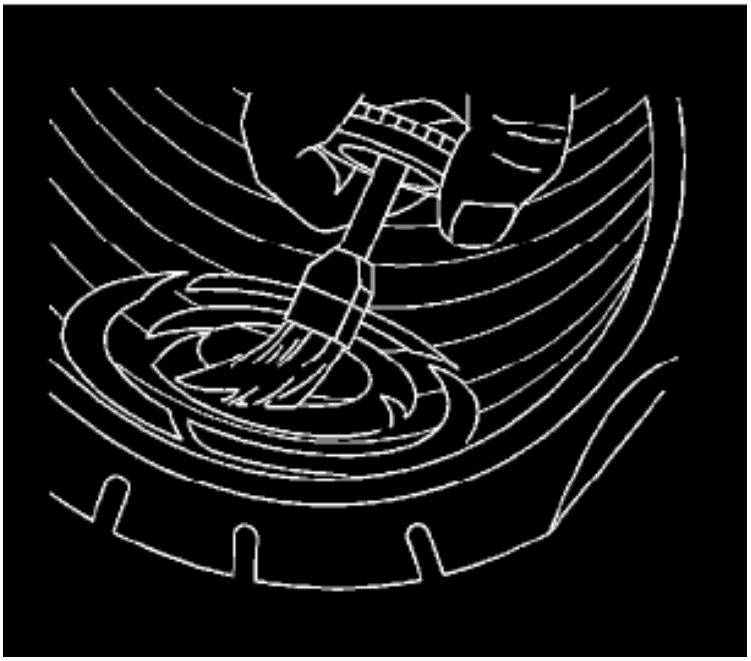
repair material manufacturer's recommendations. Without stretching the plug, cut the plug off just above the inside tire surface.

3. Consult your repair material supplier for proper repair material selection.

Repair Unit Selection

Important Do not install the repair unit in this step.





1. Center the repair unit over the injury as a reference and outline an area larger than the unit so that buffing will not remove the crayon marks. 2. Remove the repair unit. 3. DO NOT overlap

previous or multiple repair units. 4. Consult your repair material supplier for proper repair unit selection.

Buffing

1. To prevent contamination and preserve the outline, buff within the marked area thoroughly and evenly with a low speed buffing tool using a fine

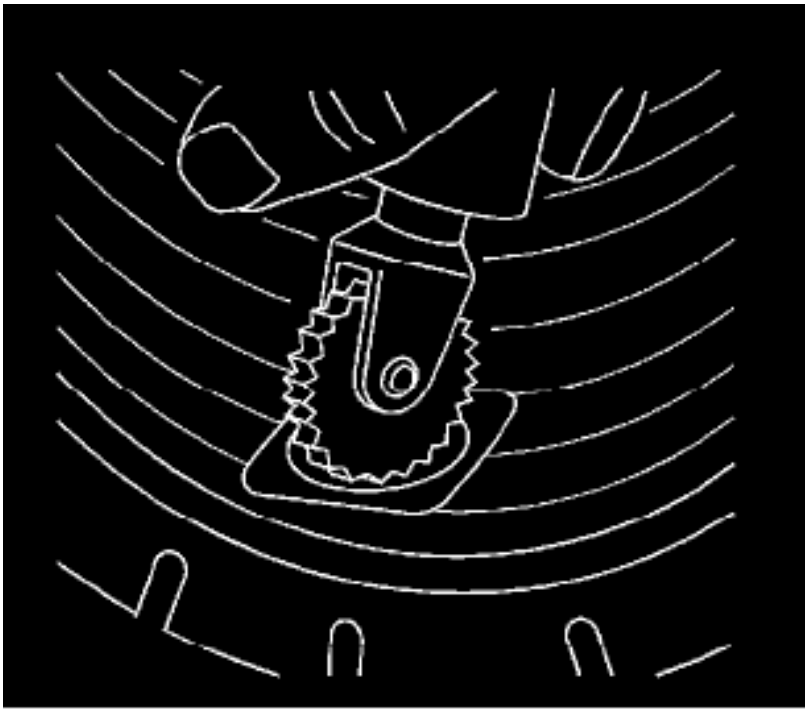
wire brush or gritted rasp.

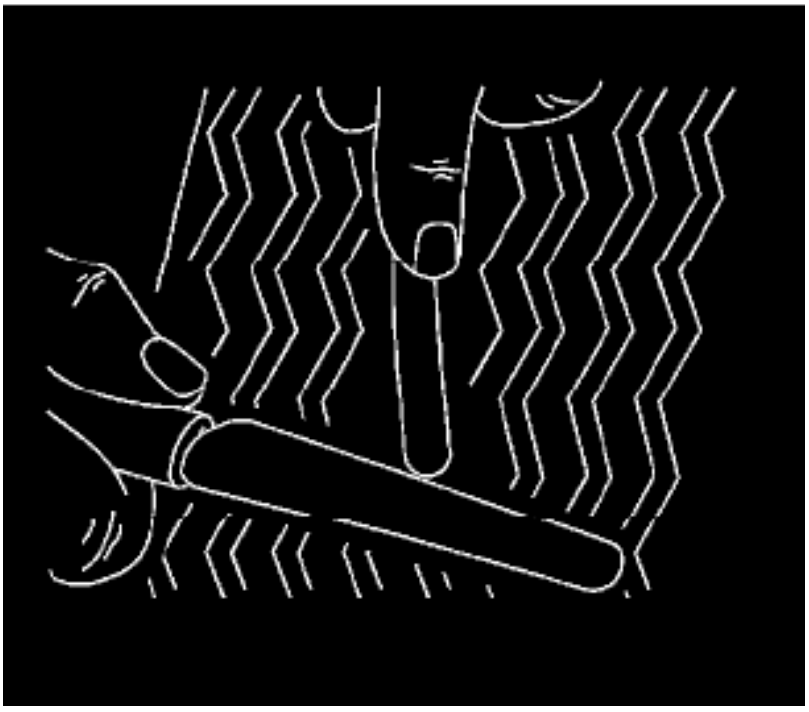
2. Buff to a smooth velvet surface (RMA #1 or #2 buffed texture). 3. Use caution not to gouge the inner liner or expose casing fabric. 4. Remove any buffing dust with a vacuum cleaner. 5. Consult your repair material supplier for a proper buffing tool.

Cementing

Apply chemical cement according to the repair material manufacturer's procedures.

Repair Unit Application





1. The tire must be in the relaxed position when the repair unit is installed (Do not spread the beads excessively).

Two-Piece Plug and Repair Units

1. If applicable, install the repair unit so that the alignment is correct. 2. Center the repair unit over the injury and stitch down thoroughly with the stitching tool, working from the center out.

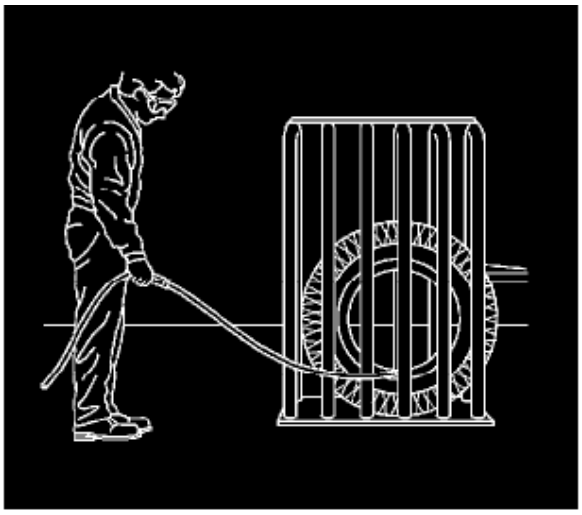
3. Being careful not to stretch the plug material, cut the plug flush with the outer tread.

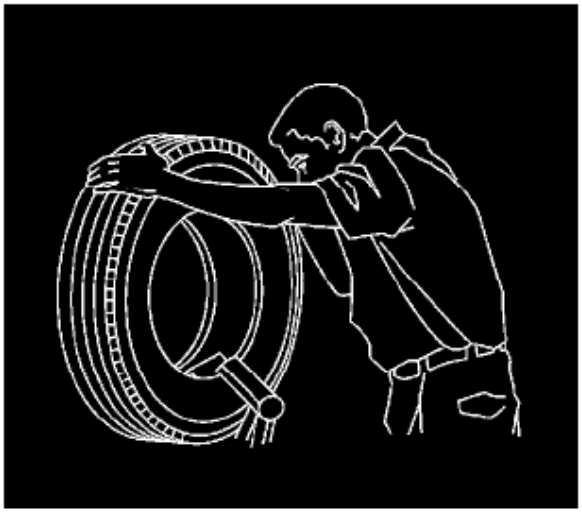
Combination Repair/Plug Units

1. Pull the plug through the injury until the repair just reaches the liner. Stitch down thoroughly. 2. Follow the repair material manufacturer's recommendations for further installation instructions.

2. Consult your repair material supplier for the proper stitching tool.

Safety Cage





GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Some run flat tires, such as the Goodyear Extended Mobility Tire (EMT) used on the Corvette, may require more than 275 kPa (40 psi) to seat the bead. In such a case, a tire safety cage must be used. Consult the tire manufacturer for its individual repair policy.

Final Inspection

1. After remounting and inflating the tire, check both beads, the repair and the valve with a water and soap solution in order to detect leaks. 2. If the tire continues to lose air, the tire must be demounted and reinspected. 3. Balance the tire and wheel assembly. Refer to Tire and Wheel Assembly Balancing - OFF Vehicle.

For additional tire puncture repair information, contact:

Rubber Manufacturers Association (RMA)

Disclaimer

Tires: All Technical Service Bulletins Wheels/Tires - Use of Nitrogen Gas in Tires

INFORMATION

Bulletin No.: 05-03-10-020C

Date: April 27, 2010

Subject: Use of Nitrogen Gas in Tires

Models:

2011 and Prior GM Passenger Cars and Trucks (including Saturn) 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X

Supercede: This bulletin is being revised to add model years. Please discard Corporate Bulletin Number 05-03-10-020B (Section 03 - Suspension).

GM's Position on the Use of Nitrogen Gas in Tires

General Motors does not oppose the use of purified nitrogen as an inflation gas for tires. We expect the theoretical benefits to be reduced in practical use due to the lack of an existing infrastructure to continuously facilitate inflating tires with nearly pure nitrogen. Even occasional inflation with compressed atmospheric air will negate many of the theoretical benefits. Given those theoretical benefits, practical limitations, and the robust design of GM original equipment TPC tires, the realized benefits to our customer of inflating their tires with purified nitrogen are expected to be minimal.

The Promise of Nitrogen: Under Controlled Conditions

Recently, nitrogen gas (for use in inflating tires) has become available to the general consumer through some retailers. The use of nitrogen gas to inflate tires is a technology used in automobile racing. The following benefits under controlled conditions are attributed to nitrogen gas and its unique properties:

- A reduction in the expected loss of Tire Pressure over time.

- A reduction in the variance of Tire Pressures with temperature changes due to reduction of water vapor concentration.

- A reduction of long term rubber degradation due to a decrease in oxygen concentrations.

Important These are obtainable performance improvements when relatively pure nitrogen gas is used to inflate tires under controlled conditions.

The Promise of Nitrogen: Real World Use

Nitrogen inflation can provide some benefit by reducing gas migration (pressure loss) at the molecular level through the tire structure. NHTSA (National Highway Traffic Safety Administration) has stated that the inflation pressure loss of tires can be up to 5% a month. Nitrogen molecules are larger than oxygen molecules and, therefore, are less prone to "seeping" through the tire casing. The actual obtainable benefits of nitrogen vary, based on the physical construction and the materials used in the manufacturing of the tire being inflated.

Another potential benefit of nitrogen is the reduced oxidation of tire components. Research has demonstrated that oxygen consumed in the oxidation process of the tire primarily comes from the inflation media. Therefore, it is reasonable to assume that oxidation of tire components can be reduced if the tire is inflated with pure nitrogen. However, only very small amounts of oxygen are required to begin the normal oxidation process. Even slight contamination of the tire inflation gas with compressed atmospheric air during normal inflation pressure maintenance, may negate the

benefits of using nitrogen.

GM Tire Quality, Technology and Focus of Importance

Since 1972, General Motors has designed tires under the TPC (Tire Performance Criteria) specification system, which includes specific requirements that ensure robust tire performance under normal usage. General Motors works with tire suppliers to design and manufacture original equipment tires for GM vehicles. The GM TPC addresses required performance with respect to both inflation pressure retention, and endurance properties for original equipment tires. The inflation pressure retention requirements address availability of oxygen and oxidation concerns, while endurance requirements ensure the mechanical structure of the tire has sufficient strength. This combination has provided our customers with tires that maintain their structural integrity throughout their useful treadlife under normal operating conditions.

Regardless of the inflation media for tires (atmospheric air or nitrogen), inflation pressure maintenance of tires is critical for overall tire, and ultimately, vehicle performance. Maintaining the correct inflation pressure allows the tire to perform as intended by the vehicle manufacturer in many areas, including comfort, fuel economy, stopping distance, cornering, traction, treadwear, and noise. Since the load carrying capability of a tire is related to inflation pressure, proper inflation pressure maintenance is necessary for the tire to support the load imposed by the vehicle without excessive structural

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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degradation.

Important Regardless of the inflation media for tires (atmospheric air or nitrogen), inflation pressure maintenance of tires is critical for overall tire, and ultimately, vehicle performance.

Disclaimer

Tires: All Technical Service Bulletins Tires - Correct Inflation Pressure Information

INFORMATION

Bulletin No.: 00-00-90-002J

Date: January 28, 2009

Subject: Information on Proper Tire Pressure

Models: 2010 and Prior GM Passenger Cars and Light Duty Trucks (including Saturn) 2009 and Prior HUMMER H2, H3, H3T 2005-2009 Saab 9-7X

Supercede:

This bulletin is being revised to add model years and clarify additional information. Please discard Corporate Bulletin Number 00-00-90-002I (Section 00 - General Information).

Important:

^ Adjustment of tire pressure for a customer with a Low Tire Pressure Monitor (TPM) light on and no codes in the TPM system is NOT a warrantable repair. Claims to simply adjust the tire pressure will be rejected.

^ ALL tires (including the spare tire) MUST be set to the recommended inflation pressure stated on the vehicle's tire placard (on driver's door) during the PRE-DELIVERY INSPECTION (PDI). Recommended inflation pressure is not the pressure printed on tire sidewall.

^ Tires may be over-inflated from the assembly plant due to the mounting process.

^ Generally a 5.6°C (10°F) temperature change will result in (is equivalent to) a 6.9 kPa (1 psi) tire pressure change.

^ 2008-2009 HUMMER H2 Only - The H2 comes standard with Light Truck "D" Load Range tires with a recommended cold inflation pressure of 289 kPa (42 psi). These tires will alert the driver to a low pressure situation at roughly 262 kPa (38 psi) due to a requirement in FMVSS 138 which specifies a Minimum Activation Pressure for each tire type. This creates a relatively narrow window of "usable" pressure values and the warning will be more sensitive to outside temperature changes during the colder months. As with other cold temperature/tire pressure issues, there is nothing wrong with the system itself. If a vehicle is brought in with this concern, check for tire damage and set all tires to the Recommended Cold Inflation Pressure shown on the vehicle placard.

Accurate tire pressures ensure the safe handling and appropriate ride characteristics of GM cars and trucks. It is critical that the tire pressure be adjusted to the specifications on the vehicle¡C■s tire placard during PDI.

Ride, handling and road noise concerns may be caused by improperly adjusted tire pressure.

The first step in the diagnosis of these concerns is to verify that the tires are inflated to the correct pressures. The recommended tire inflation pressure is listed on the vehicle¡C■s tire placard. The tire placard is located on the driver¡C■s side front or rear door edge, center pillar, or the rear compartment lid.

Tip

^ Generally a 5.6°C (10°F) temperature increase will result in (is equivalent to) a 6.9 kPa (1 psi) tire pressure increase.

^ The definition of a "cold" tire is one that has been sitting for at least 3 hours, or driven no more than 1.6 km (1 mi).

^ On extremely cold days, if the vehicle has been indoors, it may be necessary to compensate for the low external temperature by adding additional air to the tire during PDI.

^ During cold weather, the Tire Pressure Monitor (TPM) indicator light (a yellow horseshoe with an exclamation point) may illuminate. If this indicator turns off after the tires warm up (reach operating temperature), the tire pressure should be reset to placard pressure at the cold temperature.

^ The TPM system will work correctly with nitrogen in tires.

^ The TPM system is compatible with the GM Vehicle Care Tire Sealant but may not be with other commercially available sealants.

Important:

^ Do not use the tire pressure indicated on the tire itself as a guide.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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^ Always inspect and adjust the pressure when the tires are cold.

^ Vehicles that have different pressures for the front and the rear need to be adjusted after tire rotation.

Improper tire inflation may result in any or all of the following conditions:

^ Premature tire wear

^ Harsh ride

^ Excessive road noise

^ Poor handling

^ Reduced fuel economy

^ Low Tire Pressure Monitor (TPM) Light ON

^ Low Tire Pressure Message on the Drivers Information Center (DIC)

Disclaimer

Speed Symbol	Maximum Speed (km/h)	Maximum Speed (mph)
S	180	112
T	190	118
U	200	124
H	210	130
V	240	149
Z	Over 240	Over 149

Tires: All Technical Service Bulletins Tires - Speed Rated Information

Group Ref.: 3 - Steering/Suspension

Bulletin No.: 433502

Date: July, 1994

INFORMATION

SUBJECT: SPEED RATED TIRES

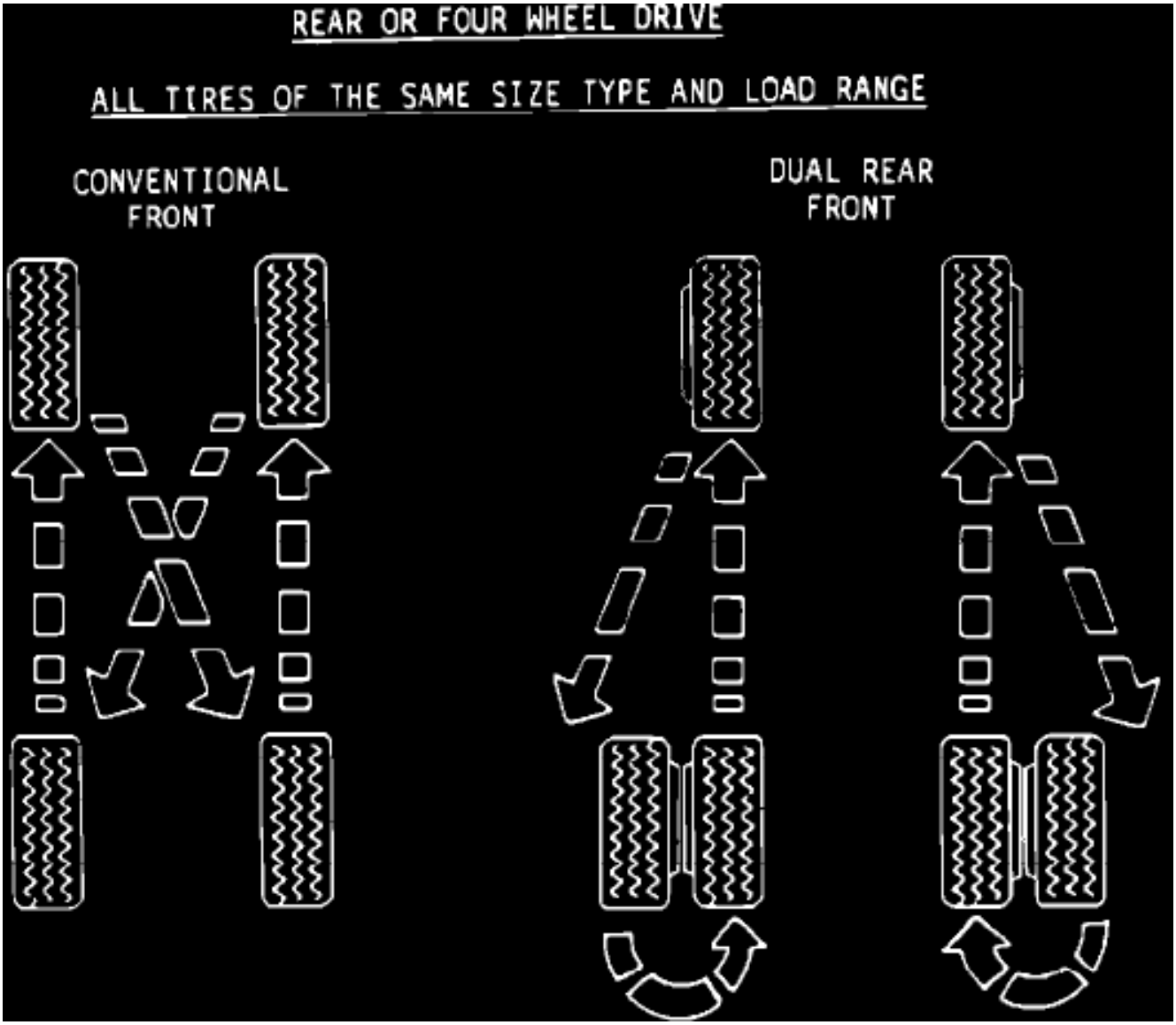
MODELS: 1995 AND PRIOR YEAR PASSENGER CARS AND LIGHT DUTY TRUCKS

All original equipment passenger car and light duty truck tires used by General Motors have a speed rating symbol molded on their sidewall. This speed symbol, along with the tire's load index, make up the service description that follows the tire's size. The original equipment tire size, speed rating, and recommended inflation pressure are listed on the tire placard usually located on the driver's door edge. WHEN REPLACING TIRES, NEVER INSTALL A TIRE THAT IS A SMALLER SIZE OR LESSER SPEED RATING THAN THAT USED AS ORIGINAL EQUIPMENT. As in the past, it is recommended that replacement tires have a TPC (Tire Performance Criteria) number on the sidewall that is identical to that on the original tires.

Common speed rating on tires used by General Motors are as follows: (see illustration)

IMPORTANT:

Most base all season tires and touring tires used by GM are S rated. Performance tires will usually have a higher speed rating. High performance tires are usually Z rated. Z rated tires carry the Z symbol within the tire size, rather than after the size in the service description. These speeds apply only at the tire's full pressure. An underinflated tire will not meet its speed rating capability.



Tires: All Technical Service Bulletins Tires (Front) - Irregular Wear

Number: 91-26-3E

Section: 3E

Date: June 1990

Corp. Bulletin No: 053501 Subject:

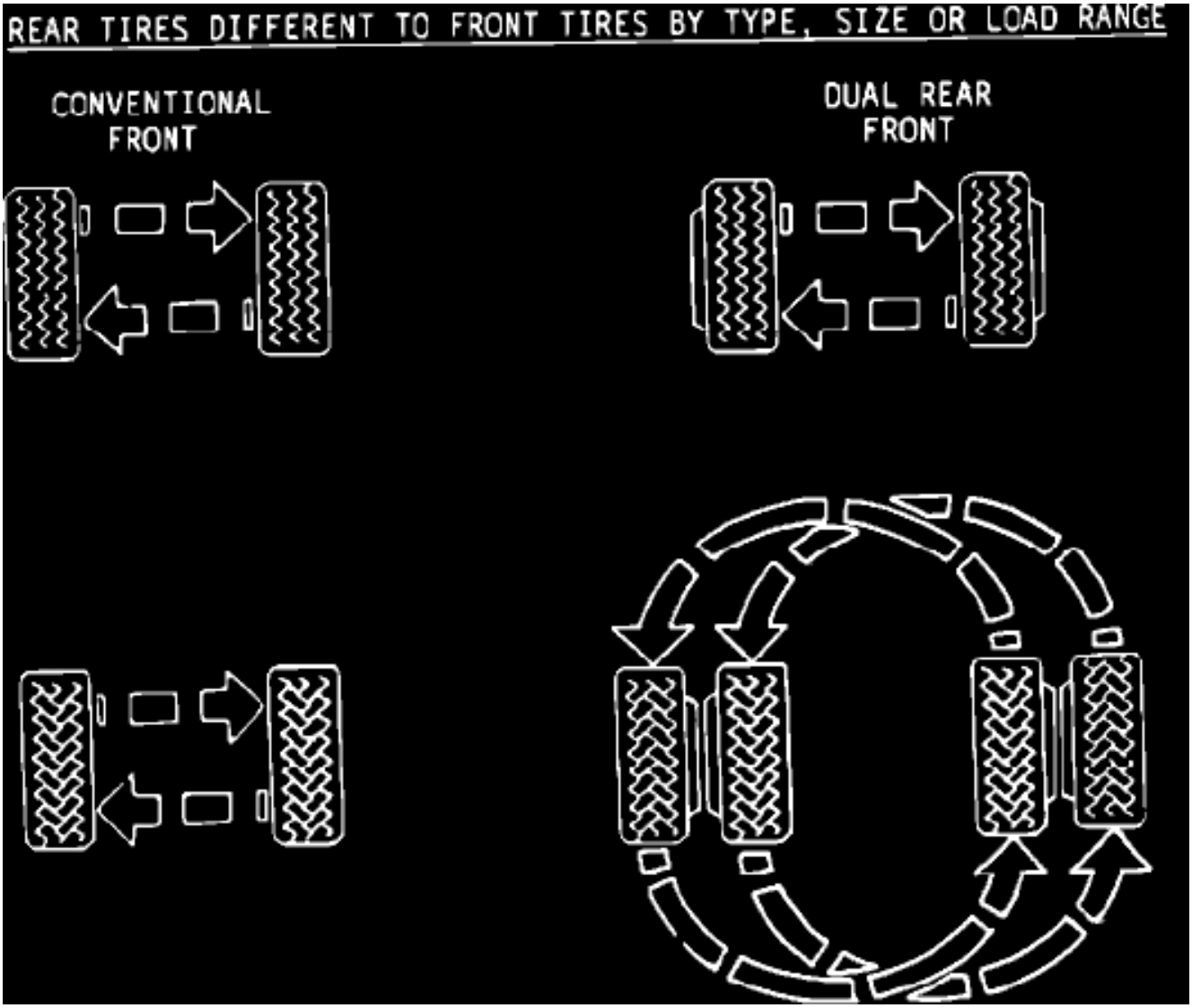
FRONT TIRE WEAR

Model and Year: 1982-91 LIGHT DUTY TRUCKS (REAR WHEEL DRIVE)

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 91-12-3E. THE KILOMETERS HAVE BEEN TRANSLATED INTO MILES. ALL COPIES OF 91-12-3E SHOULD BE DISCARDED.

Rear wheel drive trucks, equipped with All Season and/or On-Off road tires may exhibit irregular wear of; the front tires. Small amounts of irregular wear is considered normal and is not necessarily a result of incorrect alignment. Incorrect alignment (especially toe) may result in premature wear of the front tires, however agressive cornering may also have a similar effect. Drive axle tires are much less prone to irregular wear, therefore they should not be considered for comparison of wear to non-drive axle tires.

The rate of irregular wear is also dependent upon the depth of tread. New tires are more prone to irregular wear, so it is essential that tires are rotated at the proper intervals to normalize the wear.

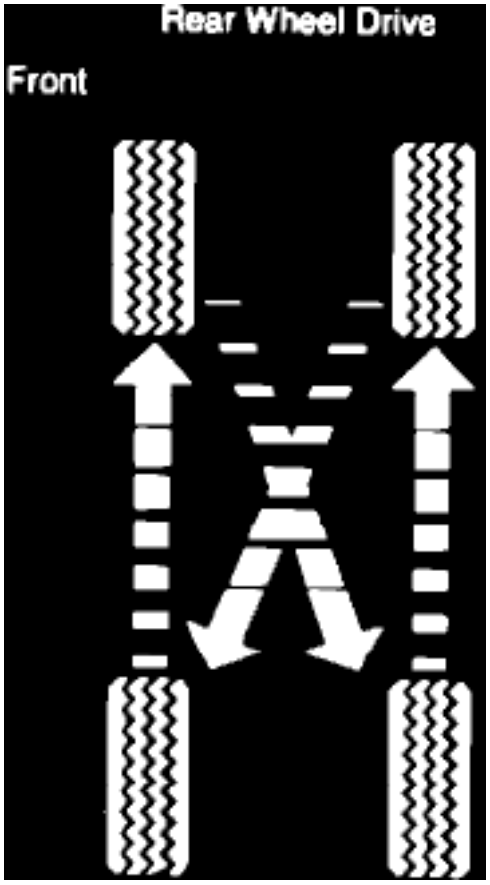


Light Duty truck tire rotation recommendations are pictured on the following page.

Rotation Guidelines for Tires used on Light Duty Trucks:

Tires used on Pickups, Vans and Utility vehicles should be rotated at the first 6,000 miles for Schedule 1 or 7,500 miles for Schedule 2 and then every 15,000 miles thereafter.

NOTE: Earlier rotation may be required should irregular wear pafterns develop due to harsh service use - the following rotation patterns are recommended for the various vehicle types and tire combinations.



Tires: All Technical Service Bulletins Tires, Front - Premature Wear on RWD Vehicles

86-13 3 DEC., 1985

Subject: FRONT POSITION TIRE WEAR ON REAR WHEEL DRIVE VEHICLES, AND ALL WEATHER TIRES

Model and Year: ALL REAR WHEEL DRIVE VEHICLES PASSENGER CARS AND LIGHT DUTY TRUCKS TO:

ALL CHEVROLET DEALERS

Some rear wheel drive vehicles may exhibit premature tire wear on the front wheel positions. The wear usually starts on the outer tread row and may progress across the full tread. This wear also usually appears as a heel and toe (high and low) wear pattern on individual tread blocks which can eventually lead to tire noise and/or tire roughness.

Rear Wheel Drive

Small amounts of heel/toe wear on the outer tread is considered normal. This wear is characteristic of new tires at full tread depth on free-rolling axles. Turning and cornering exaggerates front tire wear. Routine tire rotation at 7,500 miles using the modified 'X' method* as shown in the Owners Manual will minimize the wear. Such tires can be expected to give optimum performance for their full intended life.

If this type of wear becomes excessive and/or results in a customer inquiry, the following procedure should be followed:

1) Rotate tires using the modified 'X' pattern* shown. This allows the front tires to rotate in the opposite direction on the rear of the vehicle which will tend to even out any irregular wear quicker. It also allows all four tires to eventually run on all four positions. Tire noise may continue after rotation, but should gradually lessen after a few thousand miles.

2) Measure front alignment. The single most contributing cause of premature tire wear, except for abusive driving, is excessive toe. For best tire wear, reset toe as close to zero as the specification allows. In most cases, this will be .1~ total toe or less. Camber and caster should also be set to specification if necessary.

3) Talk to the customer about his/her tires. Explain that some amount of shoulder wear on front tires is normal and will even out with regular tire rotation. Explain that front tire shoulder wear is also exagger-

ated by hard cornering. Stress the importance of proper inflation pressure and alignment.

4. If the wear has advanced far enough, tire replacement may become necessary. When installing new tires, match the tire's high point mark to the wheel's valve and then balance. Also, alignment must be reset as specified in Step 2 above and the customer instructed to follow the modified 'X' rotation schedule at 7,500 miles.

*The modified 'X' rotation pattern does not apply to some models, such as Corvettes, Camaros, and Firebirds equipped with directional tires and/or special wheels.

Backup Lamp Switch: All Technical Service Bulletins Backup Lamps/Tailgate Window Release - Inoperative

Number: 91-459-8A

Section: 8A

Date: DEC. 1991

Corporate Bulletin No.: 168104

ASE No.: A6

Subject: BACKUP LAMPS OR TAILGATE WINDOW RELEASE INOPERATIVE

Model and Year: 1980-91 ALL LIGHT DUTY TRUCKS (EXCEPT GEO)

Owners of some 1980-1991 C/K, 1982-1991 G, 1985-1991 M/L, 1984-1991 P2,P3, 1987-1991 R/V, 1983- 1991 ST (including LLV) with automatic transmissions may comment on a condition of inoperative back-up lamps or inoperative tailgate window release. This condition occurs when the vehicle's gear shift lever is placed in the "reverse" position, but the back-up lamps do not illuminate. In addition, on the S/T utility vehicles, the electric tailgate window release does not release when the transmission gear shift lever is placed in the "park" or "neutral" position and the endgate window release button is depressed. The park/neutral and back-up lamp switch comes out of adjustment which does not allow for the contact points to remain engaged.

To correct these conditions, the contact carrier on the park/neutral and back-up lamp switch has been modified to increase switch carrier travel.

SERVICE PROCEDURE:

1. Disconnect the battery ground cable from the battery.

2. Disconnect the switch assembly harness.

3. Place the gear selector in neutral.

4. Squeeze the tangs on the switch together and remove the switch assembly.

5. Install the new switch assembly (P/N 15679680) by:

-aligning the actuator with the cutout in the steering column jacket. -inserting the tangs into the rectangular holes and pushing

down on the switch assembly.

6. Adjust the switch by moving the gear selector to park.

7. Connect the switch assembly harness.

8. Connect the negative battery cable.

9. Check for proper switch operation. Readjust the switch as necessary.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Wheels and Tires > Wheels > Component Information > Technical Service Bulletins > Recalls: > 85C02 > Oct > 84 > Recall - Firestone Steel Wheels Cracking

Wheels: Recalls Recall - Firestone Steel Wheels Cracking

Number: 85C02

Section: 3E

Date: October, 1984

Subject: PRODUCT SAFETY CAMPAIGN 85C02 FIRESTONE 16 X 6 DISC WHEEL MAY CRACK

Model and Year: 1984-1985 CHEVROLET C/K30 CHASSIS-CAB MODELS EQUIPPED WITH RPO R05 (DUAL REAR WHEELS)

TO: ALL CHEVROLET DEALERS

The National Traffic and Motor Vehicle Safety Act, as amended, provides that each vehicle which is subject to a recall campaign of this type must be adequately repaired within a reasonable time after the owner has tendered it for repair. A failure to adequately repair within 60 days after tender of a vehicle is prima facie evidence of failure to repair within a reasonable time.

If the condition is not adequately repaired within a reasonable time, the owners may be entitled to an identical or reasonably equivalent vehicle at no charge or to a refund of the purchase price less a reasonable allowance for depreciation.

To avoid having to provide these burdensome solutions, every effort must be made to promptly schedule an appointment with each owner and to repair their vehicle as soon as possible. As you will see in reading the attached copy of the letter which is being sent to owners, the owners are being instructed to contact the nearest Chevrolet Zone Office if their dealer does not remedy the condition within five days of the agreed service date. If the condition is not remedied within a reasonable time, they are instructed on how to contact the National Highway Traffic Safety Administration.

DEFECT INVOLVED

General Motors has been notified by Firestone Steel Products that a defect which relates to motor vehicle safety exists in some Firestone Steel Products 16 X 6 disc wheels, which were installed on some 1984- 1985 Chevrolet C/K30 Chassis-Cab models equipped with dual rear wheels (RPO R05). Firestone has reported that due to a possible manufacturing problem, the wheel may crack in the drop center portion of the rim. If a crack were to occur on a wheel with a tube type tire mounted to it and remain undetected, the crack could spread and eventually split the wheel resulting in rapid air pressure loss from the tire. Rapid loss of air pressure in a tire, when the vehicle is in motion, may cause loss of vehicle control and subsequent vehicle crash without prior warning. Number :

85C02

Section : 3E

DEFECT INVOLVED (CONT'D)

Dealers are to inspect all wheels and replace any that have suspect manufacturing date codes.

VEHICLES INVOLVED

Involved are certain 1984-1985 Chevrolet C/K30 Chassis-Cab Models equipped with dual rear wheels (RPO 105) and built within the following vehicle identification number breakpoints:

Plant Year From Thru

Pontiac 1984 EV142604 EV144075

Pontiac 1985 FV100001 FV100211

Involved vehicles have been identified by Vehicle Identification Number Computer Listings. Computer listings contain the complete Vehicle Identification Number, owner name and address data, and are furnished to the involved dealers with the campaign bulletin. Owner name and address data furnished will enable dealers to follow-up with owners involved in this campaign.

These listings may contain owner names and addresses obtained from State Motor Vehicle Registration Records. The use of such motor vehicle registration data for any other purpose is a violation of law in several states. Accordingly, you are urged to limit the use of this listing to the follow-up necessary to complete this campaign. Any dealer not receiving a computer listing with the campaign bulletin was not shipped any involved vehicles.

OWNER NOTIFICATION

Owners will be notified of this campaign on their vehicles by Chevrolet Motor Division (see copy of Owner Letter included with this bulletin).

DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time

forward.

Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future, you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle.

Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin. Number :

85C02

Section : 3E

SERVICE PROCEDURE

WHEEL INSPECTION

1. Raise vehicle.

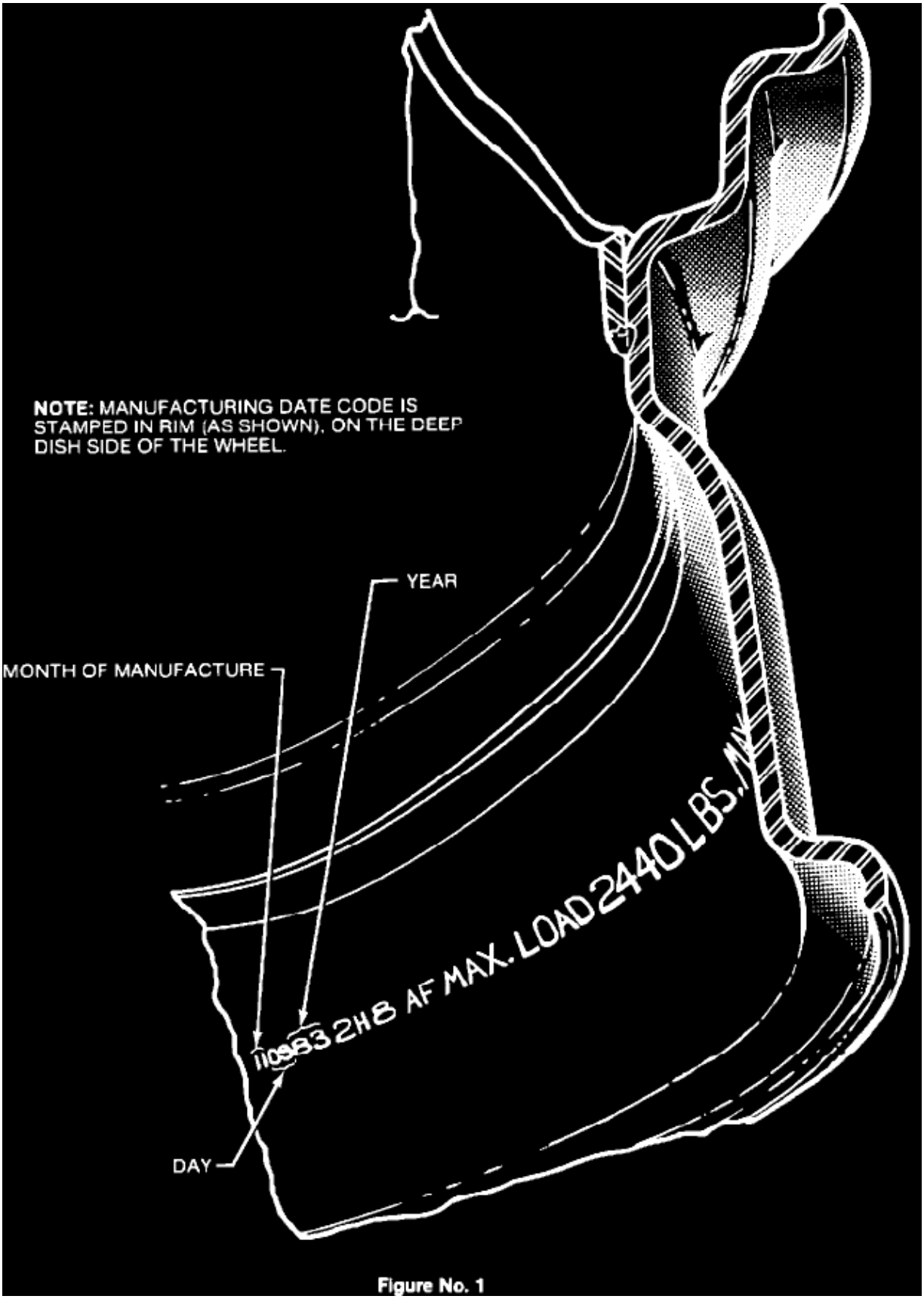

NOTE: MANUFACTURING DATE CODE IS STAMPED IN RIM (AS SHOWN), ON THE DEEP DISH SIDE OF THE WHEEL.
YEAR
MONTH OF MANUFACTURE
DAY
110983 2H8 AF MAX. LOAD 2440 LBS.

Figure No. 1

-Wheel Inspection

2. Inspect all wheels, including spare if equipped, for Manufacturing Date Code (see Figure 1).

It will be necessary to remove the rear dual wheels to inspect the inner wheel on each side.

3. If a wheel has one of the following suspect Manufacturing Date Codes or if the date code cannot be read, replace the wheel using the procedure below:

Month Day Year

7 19 84

7 20 84

7 21 84

7 22 84

7 23 84

7 24 84

7 25 84

7 26 84

4. If none of the wheels have above suspect Manufacturing Date Codes, no further action is required. Reinstall wheels as described in the 1984 Chevrolet Light Duty Truck Service Manual ST-330-84, 3E-9.

WHEEL REPLACEMENT

1. Obtain replacement wheel, P/N 14035381, and (for vehicles equipped with tubeless tires) new valve stem, P/N 274288.

2. Mask inboard and outboard sides of flat portion of wheel center section (wheel mounting surfaces) and paint with the appropriate color to match the wheel removed.

Paint is not required on the tire mounting side of rim.

3. If vehicle is equipped with tubeless tires, install new valve stem in replacement wheel.

4. Remove tire from wheel to be replaced.

5. Mount tube, if required, and tire on replacement wheel and balance the assembly (reference the 1984/1985 Light Duty Truck Service Manual ST-382-85 3E-9 for instructions).

6. Lower vehicle and install Campaign Completion label.

Number : 85C02

Section : 3E

Page No.: 5

PARTS INFORMATION

Parts required to complete this modification are to be obtained from the Warehousing and Distribution Division of General Motors (WDDGM). To ensure that these parts will be obtained as soon as possible, they should be ordered from WDDGM on a C.I.O. order with no special instruction code, but order on an advise code (2).

Part Number Quantity Description

14035381 As required 16 X 6 Disc Wheel

274288 As required Valve stem

IMPORTANT: Defective wheel(s) removed from the involved vehicles will be retained by the dealer in accordance with the instructions outlined in the dealers current Policy and Procedures Manual.

CLAIM INFORMATION

Submit a Product Campaign Claim with the information indicated below:

Parts Failed Parts Failure Labor Labor *Other

Count Part No. Allowance Code Operation Hours Hours

00 V2400 .6 .1

DESCRIPTION: Inspect all wheels, including spare when so equipped for date code only. Includes R & R rear dual wheels. No further action required.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14035381 00 V2401 1.6 .1 4.34

DESCRIPTION: Inspect all wheels, replace one (1) wheel only.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

4 14035381 00 V2402 2.3 .1 6.98

DESCRIPTION: Inspect all wheels and replace two (2) wheels. Number :

85C02

Section : 3E

Page No.: 6

CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor ***Labor Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

6 14035381 00 V2403 3.0 .1 9.62

DESCRIPTION: Inspect all wheels and replace three (3) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

8 14035381 00 V2404 3.6 .1 12.26

DESCRIPTION: Inspect all wheels and replace four (4) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

10 14035381 00 V2405 4.3 .1 14.90

DESCRIPTION: Inspect all wheels and replace five (5) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

12 14035381 00 V2406 5.0 .1 17.54

DESCRIPTION: Inspect all wheels and replace six (6) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

12 14035381 00 V2407 5.7 .1 18.30

DESCRIPTION: Inspect all wheels and replace seven (7) wheels.

Number: 85C02

Section: 3E Page No.: 7

CLAIM INFORMATION (CONT'D)

*Campaign Administrative Allowance.

**The Parts Allowance should be the sum total of the current WDDGM Dealer Net price plus 30% for wheel assemblies.

***Labor Hours includes labor time for painting, paint "mix time", tire mounting, balancing, and R & R of wheel assembly from vehicle.

The Net Amount credit will automatically be given for each labor operation to cover the cost of paint, paint supplies and valve stem(s) used in conjunction with the repair.

Dealers will automatically receive the correct labor and material allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

CAMPAIGN IDENTIFICATION LABEL

Campaign Identification Label

Each vehicle modified in accordance with the instructions outlined in this Product Campaign Bulletin will require a "Campaign Identification Label." Each label provides a space to include the five digit dealer code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen. Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner.

Apply "Campaign Identification Label" only on a clean dry surface. Number :

85C02

Section : 3E

Page No.: 8

ADMINISTRATIVE PROCEDURES

REFER TO THE CURRENT CHEVROLET SERVICE POLICIES AND PROCEDURES MANUAL AND CLAIMS PROCESSING MANUAL FOR CAMPAIGN HANDLING AND ADMINISTRATIVE PROCEDURES. Dear Chevrolet Owner:

This notice is sent to you in accordance with the requirements of the National Traffic and Motor Vehicle Safety Act.

General Motors has been notified by Firestone Steel Products that a defect which relates to motor vehicle safety exists in some Firestone Steel Products 16 X 6 disc wheels, which were installed on some 1984-1985 Chevrolet C/K30 Chassis-Cab models equipped with dual rear wheels (RPO R05). Firestone has reported that due to a possible manufacturing problem, the wheel may crack in the drop center portion of the rim. If a crack were to occur on a wheel with a tube type tire mounted to it and remain undetected, the crack could spread and eventually split the wheel resulting in rapid air pressure loss from the tire. Rapid loss of air pressure in a tire, when the vehicle is in motion, may cause loss of vehicle control and subsequent vehicle crash without prior warning.

To prevent the possibility of the condition occurring on your vehicle, please contact your Chevrolet Dealer on or after the date shown below to arrange a service date. Your dealer will inspect each wheel on your vehicle and replace it if necessary. This service will be completed at no charge to you.

Instructions for making this correction have been sent to your Chevrolet Dealer. It is estimated that parts will be available on November 13, 1984. The labor time necessary to inspect the wheels on your vehicle is approximately 30 minutes. Additional labor time to replace your vehicles wheels if

necessary, will vary between 1 and 1/2 hours and 6 hours. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

Your Chevrolet Dealer is best equipped to obtain parts and provide service to ensure your vehicle is corrected as promptly as possible. However, if you take your vehicle to your dealer on the agreed service date, and they do not remedy this condition on that date or within five days, we recommend you contact the nearest Chevrolet Zone Office, either in person or by telephone. The Zone Office will assist you and the dealer in getting your vehicle corrected. The locations and the telephone numbers of the zone offices are listed in your Owner's Manual.

After contacting your dealer and the zone office, if you are still not satisfied that we have done our best to remedy this condition without charge within a reasonable time, you may wish to write the Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590, or call 800-424-9393 (Washington D.C. residents use 426-0123). The enclosed owner reply card identifies your vehicle. Presentation of this card to your dealer will assist in making the correction in the shortest possible time. If you have sold or traded your vehicle, please let us know by completing the postage paid owner reply card and returning it to us.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your safety and continued satisfaction with our products.

Chevrolet Motor Division General Motors Corporation

Enclosure

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Wheels and Tires > Wheels > Component Information > Technical Service Bulletins > Customer Interest: > 00-03-10-006F > May > 10 > Wheels/Tires - Tire Radial Force Variation (RFV)

Wheels: Customer Interest Wheels/Tires - Tire Radial Force Variation (RFV)

INFORMATION

Bulletin No.: 00-03-10-006F

Date: May 04, 2010

Subject: Information on Tire Radial Force Variation (RFV)

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X 2000-2005 Saturn L Series 2003-2007 Saturn ION

Supercede: This bulletin is being revised to considerably expand the available information on Radial Force Variation (RFV) and should be reviewed in whole. Please discard Corporate Bulletin Number 00-03-10-006E (Section 03 - Suspension).

Important

- Before measuring tires on equipment such as the Hunter GSP9700, the vehicle MUST be driven a minimum of 16 km (10 mi) to ensure removal of any flat-spotting. Refer to Corporate Bulletin Number 03-03-10-007E - Tire/Wheel Characteristics of GM Original Equipment Tires.

- Equipment such as the Hunter GSP9700 MUST be calibrated prior to measuring tire/wheel assemblies for each vehicle.

The purpose of this bulletin is to provide guidance to GM dealers when using tire force variation measurement equipment, such as the Hunter GSP9700. This type of equipment can be a valuable tool in diagnosing vehicle ride concerns. The most common ride concern involving tire radial force variation is highway speed shake on smooth roads.

Tire related smooth road highway speed shake can be caused by three conditions: imbalance, out of round and tire force variation. These three conditions are not necessarily related. All three conditions must be addressed.

Imbalance is normally addressed first, because it is the simpler of the three to correct. Off-vehicle, two plane dynamic wheel balancers are readily available and can accurately correct any imbalance. Balancer calibration and maintenance, proper attachment of the wheel to the balancer, and proper balance weights, are all factors required for a quality balance. However, a perfectly balanced tire/wheel assembly can still be "oval shaped" and cause a vibration.

Before balancing, perform the following procedures.

Tire and Wheel Diagnosis

1. Set the tire pressure to the placard values. 2. With the vehicle raised, ensure the wheels are centered on the hub by loosening all wheel nuts and hand-tightening all nuts first by hand while

shaking the wheel, then torque to specifications using a torque wrench, NOT a torque stick.

3. Visually inspect the tires and the wheels. Inspect for evidence of the following conditions and correct as necessary:

- Missing balance weights

- Bent rim flange

- Irregular tire wear

- Incomplete bead seating

- Tire irregularities (including pressure settings)

- Mud/ice build-up in wheel

- Stones in the tire tread

- Remove any aftermarket wheels and/or tires and restore vehicle to original condition prior to diagnosing a smooth road shake condition.

4. Road test the vehicle using the Electronic Vibration Analyzer (EVA) essential tool. Drive for a sufficient distance on a known, smooth road

surface to duplicate the condition. Determine if the vehicle is sensitive to brake apply. If the brakes are applied lightly and the pulsation felt in the steering wheel increases, refer to the Brakes section of the service manual that deals with brake-induced pulsation. If you can start to hear the vibration as a low boom noise (in addition to feeling it), but cannot see it, the vehicle likely has a first order (one pulse per propshaft revolution) driveline vibration. Driveline first order vibrations are high enough in frequency that most humans can start to hear them at highway speeds, but are too high to be able to be easily seen. These issues can be caused by driveline imbalance or misalignment. If the vehicle exhibits this low boom and the booming pulses in-and-out on a regular basis (like a throbbing), chances are good that the vehicle could have driveline vibration. This type

P-Metric tires of passenger cars	18 lbs (8 kg) or less
P-Metric tires on light trucks	24 lbs (11 kg) or less
LT-tires on light trucks	35 lbs (16 kg) or less

of vibration is normally felt more in the "seat of the pants" than the steering wheel.

5. Next, record the Hertz (Hz) reading as displayed by the EVA onto the tire data worksheet found at the end of this bulletin. This should be done

after a tire break-in period of at least 16 km (10 mi) at 72 km/h (45 mph) or greater, in order to eliminate any possible tire flat-spotting. This reading confirms what the vehicle vibration frequency is prior to vehicle service and documents the amount of improvement occurring as the result of the various steps taken to repair. Completing the Steering Wheel Shake Worksheet below is required. A copy of the completed worksheet must be saved with the R.O. and a copy included with any parts returned to the Warranty Parts Center for analysis. A reading of 35 to 50 Hz typically indicates a first order propshaft vibration. If this is the situation, refer to Corporate Bulletin Number 08-07-30-044D. Generally, a reading between 10 and 20 Hz indicates a tire/wheel vibration and if this is the reading obtained, continue using this bulletin. If the tire 1st order vibration goes away and stays away during this evaluation, the cause is likely tire flat-spotting. Tire flat-spotting vibration may come and go at any speed over 72 km/h (45 mph) during the first 10 minutes of operation, if vibration continues after 10 minutes of driving at speeds greater than 72 km/h (45 mph), tire flat-spotting can be ruled out as the cause for vibration.

6. If flat-spotting is the cause, provide the explanation that this has occurred due to the vehicle being parked for long periods of time and that the

nature of the tire is to take a set. Refer to Corporate Bulletin Number 03-03-10-007E: Information on Tire/Wheel Characteristics (Vibration, Balance, Shake, Flat Spotting) of GM Original Equipment Tires.

7. If the road test indicates a shake/vibration exists, check the imbalance of each tire/wheel assembly on a known, calibrated, off-car dynamic

balancer.Make sure the mounting surface of the wheel and the surface of the balancer are absolutely clean and free of debris. Be sure to chose the proper cone/collet for the wheel, and always use the pilot bore for centering. Never center the wheel using the hub-cap bore since it is not a precision machined surface. If any assembly calls for more than 1/4 ounce on either rim flange, remove all balance weights and rebalance to as close to zero as possible. If you can see the vibration (along with feeling it) in the steering wheel (driving straight without your hands on the wheel), it is very likely to be a tire/wheel first order (one pulse per revolution) disturbance. First order disturbances can be caused by imbalance as well as non-uniformities in tires, wheels or hubs. This first order frequency is too low for a human to hear, but if the amplitude is high enough, it can be seen.

If a vibration or shake still exists after balancing, any out of round conditions, of the wheel, and force variation conditions of the tire, must be addressed. Equipment such as the Hunter GSP9700 can address both (it is also a wheel balancer).

Tire radial force vibration (RFV) can be defined as the amount of stiffness variation the tire will produce in one revolution under a constant load. Radial force variation is what the vehicle feels because the load (weight) of the vehicle is always on the tires. Although free runout of tires (not under load) is not always a good indicator of a smooth ride, it is critical that total tire/wheel assembly runout be within specification.

Equipment such as the Hunter GSP9700 loads the tire, similar to on the vehicle, and measures radial force variation of the tire/wheel assembly. Note that the wheel is affecting the tire's RFV measurement at this point. To isolate the wheel, its runout must be measured. This can be easily done on the Hunter, without the need to set up dial indicators. If the wheel meets the runout specification, the tire's RFV can then be addressed.

After measuring the tire/wheel assembly under load, and the wheel alone, the machine then calculates (predicts) the radial force variation of the tire. However, because this is a prediction that can include mounting inaccuracies, and the load wheel is much smaller in diameter than used in tire production, this type of service equipment should NOT be used to audit new tires. Rather, it should be used as a service diagnostic tool to minimize radial force variation of the tire/wheel assembly.

Equipment such as the Hunter GSP9700 does an excellent job of measuring wheel runout, and of finding the low point of the wheel (for runout) and the high point of the tire (for radial force variation). This allows the tire to be matched mounted to the wheel for lowest tire/wheel assembly force variation.

The machine will simplify this process into easy steps. The following assembly radial force variation numbers should be used as a guide:

When measuring RFV and match mounting tires perform the following steps.

Measuring Wheel Runout and Assembly Radial Force Variation

Important The completed worksheet at the end of this bulletin must be attached to the hard copy of the repair order.

- Measure radial force variation and radial runout.

- If a road force/balancing machine is used, record the radial force variation (RFV) on the worksheet at the end of this bulletin. It may be of benefit to have the lowest RFV assembly to the front left corner. If the machine is not available and the EVA data suggests there is an issue, swap the tire and wheel assemblies from the front to the back. Re-check on the EVA and if the problem still exists, test another vehicle to find tires that do not exhibit the same frequency and swap those tires onto the subject vehicle.

- If a runout/balancing machine is used, record the radial runout of the tire/wheel assemblies on the worksheet at the end of this bulletin. If one or more of the tire/wheel assemblies are more than.040 in (1.02 mm), match mount the tire to the wheel to get below.040 in (1.02 mm). For sensitive customers, readings of 0.030 inch (0.76 mm) or less are preferable, it may also be of benefit to have the lowest runout assembly to the front left corner. If the machine is not available and the EVA data suggests there is an issue, swap the tire and wheel assemblies from the front to the back. Re-check on the EVA and if the problem still exists, test another vehicle to find tires that do not exhibit the same frequency and swap those tires

onto the subject vehicle.

- After match mounting, the tire/wheel assembly must be rebalanced.

If match mounting tires to in-spec wheels produces assembly values higher than these, tire replacement may be necessary. Replacing tires at lower values will probably mean good tires are being condemned. Because tires can sometimes become temporarily flat-spotted, which will affect force variation, it is important that the vehicle be driven at least 16 km (10 mi) prior to measuring. Tire pressure must also be adjusted to the usage pressure on the vehicle's tire placard prior to measuring.

Most GM vehicles will tolerate radial force variation up to these levels. However, some vehicles are more sensitive, and may require lower levels. Also, there are other tire parameters that equipment such as the Hunter GSP9700 cannot measure that may be a factor. In such cases, TAC should be contacted for further instructions.

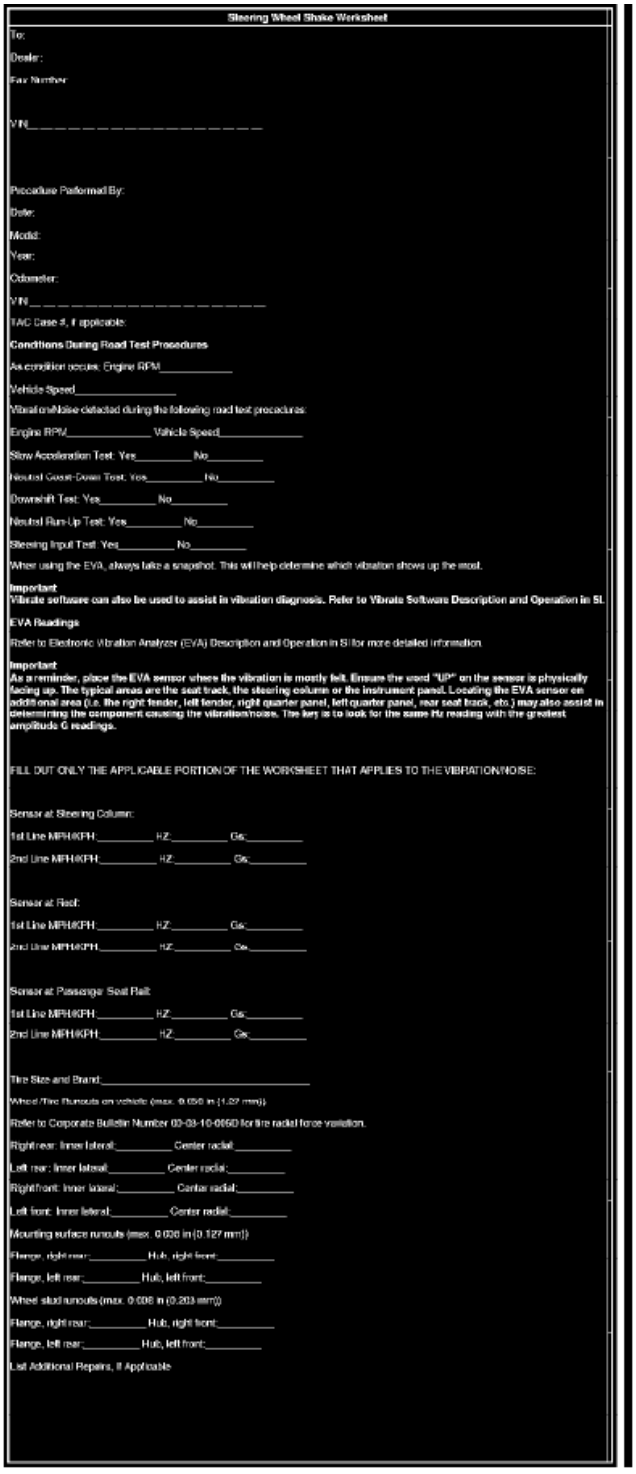
Important

- When mounting a GM wheel to a wheel balancer/force variation machine, always use the wheel's center pilot hole. This is the primary centering mechanism on all GM wheels; the bolt holes are secondary. Usually a back cone method to the machine should be used. For added accuracy and repeatability, a flange plate should be used to clamp the wheel onto the cone and machine. This system is offered by all balancer manufacturers in GM's dealer program.

- Any type of service equipment that removes tread rubber by grinding, buffing or truing is NOT recommended, and may void the tire warranty. However, tires may have been ground by the tire company as part of their tire manufacturing process. This is a legitimate procedure.

Steering Wheel Shake Worksheet

When diagnosing vibration concerns, use the following worksheet in conjunction with the appropriate Vibration Analysis-Road testing procedure in the Vibration Correction sub-section in SI.



Steering Wheel Shake Worksheet

To:

Dealer:

Fax Number:

VIN:_ _

Procedure Performed By:

Date:

Model:

Year:

Odometer:

VIN:_ _

TAC Case #, if applicable:

Conditions During Road Test Procedures

As condition occurs: Engine RPM:_____

Vehicle Speed:_____

Vibration/Noise detected during the following road test procedures:

Engine RPM:_____ Vehicle Speed:_____

Slow Acceleration Test: Yes:_____ No:_____

Neutral Coast-Down Test: Yes:_____ No:_____

Downshift Test: Yes:_____ No:_____

Neutral Run-Up Test: Yes:_____ No:_____

Steering Input Test: Yes:_____ No:_____

When using the EVA, always take a snapshot. This will help determine which vibration shows up the most.

Important
Vibrate software can also be used to assist in vibration diagnosis. Refer to Vibrate Software Description and Operation in SI.

EVA Readings

Refer to Electronic Vibration Analyzer (EVA) Description and Operation in SI for more detailed information.

Important
As a reminder, place the EVA sensor where the vibration is mostly felt. Ensure the word "UP" on the sensor is physically facing up. The typical areas are the seat track, the steering column or the instrument panel. Locating the EVA sensor on additional area (i.e. the right fender, left fender, right quarter panel, left quarter panel, rear seat track, etc.) may also assist in determining the component causing the vibration/noise. The key is to look for the same Hz reading with the greatest amplitude G readings.

FILL OUT ONLY THE APPLICABLE PORTION OF THE WORKSHEET THAT APPLIES TO THE VIBRATION/NOISE:

Sensor at Steering Column:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Sensor at Rail:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Sensor at Passenger Seat Rail:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Tire Size and Brand:_____

Wheel/Tire Runouts on vehicle (max. 0.050 in (1.27 mm)):

Refer to Corporate Bulletin Number 00-03-10-006D for tire radial force variation.

Right rear: Inner lateral:_____ Center radial:_____

Left rear: Inner lateral:_____ Center radial:_____

Right front: Inner lateral:_____ Center radial:_____

Left front: Inner lateral:_____ Center radial:_____

Mounting surface runouts (max. 0.005 in (0.127 mm)):

Flange, right rear:_____ Hub, right front:_____

Flange, left rear:_____ Hub, left front:_____

Wheel stud runouts (max. 0.008 in (0.203 mm)):

Flange, right rear:_____ Hub, right front:_____

Flange, left rear:_____ Hub, left front:_____

List Additional Repairs, If Applicable:

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Refer to the appropriate section of SI for specifications and repair procedures that are related to the vibration concern.

Disclaimer

Wheels: Customer Interest Tires/Wheels - Low Tire/Leaking Cast Aluminum Wheels

TECHNICAL

Bulletin No.: 05-03-10-003F

Date: April 27, 2010

Subject: Low Tire Pressure, Leaking Cast Aluminum Wheels (Repair with Adhesive Sealant)

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X with Cast Aluminum Wheels

Supercede: This bulletin is being revised to update the model years and the bulletin reference information. Please discard Corporate Bulletin Number 05-03-10-003E (Section 03 - Suspension).

Condition

Some customers may comment on a low tire pressure condition.

Diagnosis of the low tire pressure condition indicates an air leak through the cast aluminum wheel.

Cause

Porosity in the cast aluminum wheel may be the cause.

Notice

This bulletin specifically addresses issues related to the wheel casting that may result in an air leak. For issues related to corrosion of the wheel in service, please refer to Corporate Bulletin Number 08-03-10-006C - Tire Slowly Goes Flat, Tire Air Loss, Low Tire Pressure Warning Light Illuminated, Aluminum Wheel Bead Seat Corrosion (Clean and Resurface Wheel Bead Seat).

Correction

1. Remove the tire and wheel assembly from the vehicle. Refer to the appropriate service procedure in SI. 2. Locate the leaking area by inflating the tire to 276 kPa (40 psi) and dipping the tire/wheel assembly in a water bath, or use a spray bottle with soap

and water to locate the specific leak location.

Important

- If the porosity leak is located in the bead area of the aluminum rim (where the tire meets the rim), the wheel should be replaced.

- If two or more leaks are located on one wheel, the wheel should be replaced.

3. If air bubbles are observed, mark the location.

- If the leak location is on the tire/rubber area, refer to Corporate Bulletin Number 04-03-10-001F - Tire Puncture Repair Procedures for All Cars and Light Duty Trucks.

- If the leak is located on the aluminum wheel area, continue with the next step.

4. Inscribe a mark on the tire at the valve stem in order to indicate the orientation of the tire to the wheel. 5. Dismount the tire from the wheel. Refer to Tire Mounting and Dismounting. 6. Remove the tire pressure sensor. Refer to Tire Pressure Sensor removal procedure in SI. 7. Scuff the INSIDE rim surface at the leak area with #80 grit paper and clean the area with general purpose

cleaner, such as 3M(R) General Purpose

Adhesive Cleaner, P/N 08984, or equivalent.

8. Apply a 3 mm (0.12 in) thick layer of Silicone - Adhesive/Sealant, P/N 12378478 (in Canada, use 88900041), or equivalent, to the leak area. 9. Allow for the adhesive/sealant to dry.

Notice Caution must be used when mounting the tire so as not to damage the sealer. Damaging the repair area may result in an air leak.

Part Number	Description
12378478 (in Canada, use 88900041)	Silicone - Adhesive/Sealant
3M(R) 08984	3M(R) General Purpose Adhesive Cleaner

Labor Operation	Description	Labor Time
E0420	Wheel - One - R&R Or Replace	Use Published Labor operation Time
Add:	To Repair Porosity On Aluminum Wheel	
Add:	To Repair Each Additional Wheel	

Labor Operation	Description	Failed Object	Fault/Reason	Location Code	Warranty Type	Repair/Action Code	Labor Time
7711001	Wheel - One - R&R Or Replace	77110	55	3-left 4-right 5-all	01	05	Use Published Labor Operation Time
add 7711003	To Repair Porosity On Aluminum Wheel	-	-	-	-	-	0.1 hr
add 7711002	To Repair Each Additional Wheel	-	-	-	-	-	Use Published Labor Operation Time

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10. Align the inscribed mark on the tire with the valve stem on the wheel. 11. Reinstall the Tire Pressure Sensor. Refer to Tire Pressure Sensor installation procedure in SI. 12. Mount the tire on the wheel. Refer to Tire Mounting and Dismounting. 13. Pressurize the tire to 276 kPa (40 psi) and inspect for leaks. 14. Adjust tire pressure to meet the placard specification. 15. Balance the tire/wheel assembly. Refer to Tire and Wheel Assembly Balancing - Off-Vehicle. 16. Install the tire and wheel assembly onto the vehicle. Refer to the appropriate service procedure in SI.

Parts Information

Warranty Information (excluding Saab U.S. Models)

Important The Silicone - Adhesive/Sealant comes in a case quantity of six. ONLY charge warranty one tube of adhesive/sealant per wheel repair.

For vehicles repaired under warranty, use:

One leak repair per wheel.

Warranty Information (Saab U.S. Models)

For vehicles repaired under warranty, use the table above.

Disclaimer

Wheels: All Technical Service Bulletins Wheels - Chrome Wheel Staining/Pitting/Corrosion

INFORMATION

Bulletin No.: 00-03-10-002F

Date: April 21, 2011

Subject: Chemical Staining, Pitting, Corrosion and/or Spotted Appearance of Chromed Aluminum Wheels

Models:

2012 and Prior GM Cars and Trucks

Supercede: This bulletin is being revised to update model years, suggest additional restorative products and add additional corrosion information. Please discard Corporate Bulletin Number 00-03-10-002E (Section 03 - Suspension). Important You may give a copy of this bulletin to the customer.

What is Chemical Staining of Chrome Wheels? Figure 1

Chemical staining in most cases results from acid based cleaners (refer to Figure 1 for an example). These stains are frequently milky, black, or greenish in appearance. They result from using cleaning solutions that contain acids on chrome wheels. Soap and water is usually sufficient to clean wheels.

If the customer insists on using a wheel cleaner they should only use one that specifically states that it is safe for chromed wheels and does not contain anything in the following list. (Dealers should also survey any products they use during prep or normal cleaning of stock units for these chemicals.)

- Ammonium Bifluoride (fluoride source for dissolution of chrome)

- Hydrofluoric Acid (directly dissolves chrome)

- Hydrochloric Acid (directly dissolves chrome)

- Sodium Dodecylbenzenesulfonic Acid

- Sulfamic Acid

- Phosphoric Acid

- Hydroxyacetic Acid

Notice

Many wheel cleaner instructions advise to take care to avoid contact with painted surfaces. Most customers think of painted surfaces as the fenders, quarter panels and other exterior sheet metal. Many vehicles have painted brake calipers. Acidic wheel cleaners may craze, crack, or discolor the paint on the brake calipers. Damage from wheel cleaners is not covered under the vehicle new car warranty. Soap and water applied with a soft brush is usually all that is required to clean the calipers.

Whenever any wheel cleaner is used, it must be THOROUGHLY rinsed off of the wheel with clean, clear water. Special care must be taken to rinse under the hub cap, balance weights, wheel nuts, lug nut caps, between the wheel cladding and off the back side of the wheel. Wheels returned to the Warranty Parts Center (WPC) that exhibit damage from wheel cleaners most often have the damage around and under the wheel weight where the cleaner was incompletely flushed away.

Notice

Do not use cleaning solutions that contain hydrofluoric, oxalic and most other acids on chrome wheels (or any wheels).

If the customer is unsure of the chemical make-up of a particular wheel cleaner, it should be avoided.

For wheels showing signs of milky staining from acidic cleaners, refer to Customer Assistance and Instructions below.

Warranty of Stained Chrome Wheels

Stained wheels are not warrantable. Most acid based cleaners will permanently stain chrome wheels. Follow-up with dealers has confirmed that such cleaners were used on wheels that were returned to the Warranty Parts Center (WPC). Any stained wheels received by the WPC will be charged back to the dealership. To assist the customer, refer to Customer Assistance and Instructions below.

Pitting or Spotted Appearance of Chrome Wheels Figure 2

A second type or staining or finish disturbance may result from road chemicals, such as calcium chloride used for dust control of unpaved roads. The staining will look like small pitting (refer to Figure 2). This staining will usually be on the leading edges of each wheel spoke, but may be uniformly distributed. If a vehicle must be operated under such conditions, the chrome wheels should be washed with mild soap and water and thoroughly rinsed as soon as conveniently possible.

Important Road chemicals, such as calcium chloride used for dust control of unpaved roads, can also stain chrome wheels. The staining will look like small pitting. This staining will usually be on the leading edges of each wheel spoke. This is explained by the vehicle traveling in the forward direction while being splashed by the road chemical. If a vehicle must be operated under such conditions, the chrome wheels should be washed with mild soap and water and thoroughly rinsed as soon as conveniently possible.

Warranty of Pitted or Spotted Chrome Wheels

Wheels returned with pitting or spotting as a result of road chemicals may be replaced one time. Damage resulting from contact with these applied road chemicals is corrosive to the wheels finish and may cause damage if the wheels are not kept clean.

Important Notify the customer that this is a one time replacement. Please stress to the customer the vital importance of keeping the wheels clean if they are operating the vehicle in an area that applies calcium chloride or other dust controlling chemicals! "GM of Canada" dealers require prior approval by the District Manager - Customer Care and Service Process (DM-CCSP).

"Stardust" Corrosion of Chrome Wheels Figure 3

A third type of finish disturbance results from prolonged exposure to brake dust and resultant penetration of brake dust through the chrome. As brakes are applied hot particles of brake material are thrown off and tend to be forced through the leading edge of the wheel spoke windows by airflow. These

hot particles embed themselves in the chrome layer and create a small pit. If the material is allowed to sit on the wheel while it is exposed to moisture or salt, it will corrode the wheel beneath the

chrome leaving a pit or small blister in the chrome.

Heavy brake dust build-up should be removed from wheels by using GM Chrome Cleaner and Polish, P/N 1050173 (in Canada use 10953013). For moderate cleaning, light brake dust build-up or water spots use GM Swirl Remover Polish, P/N 12377965 (in Canada, use Meguiars Plast-X(TM) Clear Plastic Cleaner and Polish #G12310C**). After cleaning, the wheel should be waxed using GM Cleaner Wax, P/N 12377966 (in Canada, use Meguiars Cleaner Wax #M0616C**), which will help protect the wheel from brake dust and reduce adhesion of any brake dust that gets on the wheel surface. For general maintenance cleaning, PEEK Metal Polish† may be used. It will clean and shine the chrome and leave behind a wax coating that may help protect the finish.

Warranty of Stardust Corroded Chrome Wheels

Wheels returned with pitting or spotting as a result of neglect and brake dust build-up may be replaced one time.

Important Notify the customer that this is a one time replacement. Please stress to the customer the vital importance of keeping the wheels clean and free of prolonged exposure to brake dust build-up. "GM of Canada" dealers require prior approval by the District Manager - Customer Care and Service Process (DM-CCSP).

Customer Assistance and Instructions

GM has looked for ways customers may improve the appearance of wheels damaged by acidic cleaners. The following product and procedure has been found to dramatically improve the appearance of stained wheels. For wheels that have milky stains caused by acidic cleaners try the following:

Notice

THE 3M CHROME AND METAL POLISH REQUIRED FOR THIS PROCEDURE IS AN EXTREMELY AGGRESSIVE POLISH/CLEANER. THE WHEELS MUST BE CLEANED BEFORE APPLICATION TO AVOID SCRATCHING THE WHEEL SURFACE. THIS PRODUCT WILL REDUCE THE THICKNESS OF THE CHROME PLATING ON THE WHEEL AND IF USED INCORRECTLY OR EXCESSIVELY MAY REMOVE THE CHROME PLATING ALL TOGETHER, EXPOSING A LESS BRIGHT AND BRASSY COLORED SUB-LAYER. FOLLOW INSTRUCTIONS EXACTLY.

1. Wash the wheels with vigorously with soap and water. This step will clean and may reduce wheel staining. Flood all areas of the wheel with water

to rinse.

2. Dry the wheels completely.

Notice Begin with a small section of the wheel and with light pressure buff off polish and examine results. ONLY apply and rub with sufficient force and time to remove enough staining that you are satisfied with the results. Some wheels may be stained to the extent that you may only achieve a 50% improvement while others may be able to be restored to the original lustre. IN ALL CASES, only apply until the results are satisfactory.

3. Apply 3M Chrome and Metal Polish #39527* with a clean terry cloth towel. As you apply the polish, the staining will be diminished. 4. When dry, buff off the polish with a clean portion of the towel. 5. Repeat application of the 3M Chrome and Metal Polish until satisfied with the results. If continued applications fail to improve the appearance

further discontinue use.

This procedure will improve the appearance of the wheels and may, with repeated applications, restore the finish dramatically. For wheels that exhibit spotting from road chemicals the above procedure may marginally improve the condition but will not restore the finish or remove the pitting. In this type of staining the wheel finish has actually been removed in spots and no manner of cleaning will restore the finish.

†*We believe this source and their products to be reliable. There may be additional manufacturers of such products/materials. General Motors does not endorse, indicate any preference for or assume any responsibility for the products or material from this firm or for any such items that may be available from other sources.

Parts Information

Part Number	Description
12377965 G12310C (Canada)	GM Swirl Remover Polish Meguiars Plast-X Clear Plastic Cleaner & Polish
12377966 M0616C (Canada)	GM Cleaner Wax Meguiars Cleaner Wax**
1050173 (in Canada use 10953013)	GM Chrome Cleaner and Polish
39527	3M Chrome and Metal Polish* (10 oz)
33002	PEEK Polish† 100 ml Tube (www.tripeek.com)

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*This product is currently available from 3M. To obtain information for your local retail location please call 3M at 1-888-364-3577.

**This product is currently available from Meguiars (Canada). To obtain information for your local retail location please call Meguiars at 1-800-347-5700 or at www.meguiarscanada.com.

^ This product is currently available from Tri-Peek International. To obtain information for your local retail location please call Tri-Peek at

1-877-615-4272 or at www.tripeek.com.

Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Wheels and Tires > Wheels > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Wheels: > 99-08-51-007E > Mar > 11 > Wheels/Tires - Refinishing Aluminum Wheels

INFORMATION

Bulletin No.: 99-08-51-007E

Date: March 17, 2011

Subject: Refinishing Aluminum Wheels

Models:

2012 and Prior GM Passenger Cars and Trucks

Supercede: This bulletin is being revised to add additional model years. Please discard Corporate Bulletin Number 99-08-51-007D (Section 08 - Body and Accessories).

This bulletin updates General Motor's position on refinishing aluminum wheels. GM does not endorse any repairs that involve welding, bending, straightening or re-machining. Only cosmetic refinishing of the wheel's coatings, using recommended procedures, is allowed.

Evaluating Damage

In evaluating damage, it is the GM Dealer's responsibility to inspect the wheel for corrosion, scrapes, gouges, etc. The Dealer must insure that such damage is not deeper than what can be sanded or polished off. The wheel must be inspected for cracks. If cracks are found, discard the wheel. Any wheels with bent rim flanges must not be repaired or refinished. Wheels that have been refinished by an outside company must be returned to the same vehicle. The Dealer must record the wheel ID stamp or the cast date on the wheel in order to assure this requirement. Refer to Refinisher's Responsibility - Outside Company later in this bulletin.

Aluminum Wheel Refinishing Recommendations

- Chrome-plated aluminum wheels Re-plating these wheels is not recommended.

- Polished aluminum wheels These wheels have a polyester or acrylic clearcoat on them. If the clearcoat is damaged, refinishing is possible. However, the required refinishing process cannot be performed in the dealer environment. Refer to Refinisher's Responsibility - Outside Company later in this bulletin.

- Painted aluminum wheels These wheels are painted using a primer, color coat, and clearcoat procedure. If the paint is damaged, refinishing is possible. As with polished wheels, all original coatings must be removed first. Media blasting is recommended. Refer to GM Aluminum Refinishing Bulletin #53-17-03A for the re-painting of this type of wheel.

- Bright, machined aluminum wheels These wheels have a polyester or acrylic clearcoat on them. In some cases, the recessed "pocket" areas of the wheel may be painted. Surface refinishing is possible. The wheel must be totally stripped by media blasting or other suitable means. The wheel should be resurfaced by using a sanding process rather than a machining process. This allows the least amount of material to be removed.

Important Do not use any re-machining process that removes aluminum. This could affect the dimensions and function of the wheel.

Painting is an option to re-clearcoating polished and bright machined aluminum wheels. Paint will better mask any surface imperfections and is somewhat more durable than clearcoat alone. GM recommends using Corsican SILVER WAEQ9283 for a fine "aluminum-like" look or Sparkle SILVER WA9967 for a very bright look. As an option, the body color may also be used. When using any of the painting options, it is recommended that all four wheels be refinished in order to maintain color uniformity. Refer to GM Aluminum Refinishing Bulletin #53-17-03A for specific procedures and product recommendations.

Refinisher's Responsibility - Outside Company

Important Some outside companies are offering wheel refinishing services. Such refinished wheels will be permanently marked by the refinisher and are warranted by the refinisher. Any process that re-machines or otherwise re-manufactures the wheel should not be used.

A refinisher's responsibility includes inspecting for cracks using the Zyglo system or the equivalent. Any cracked wheels must not be refinished. No welding, hammering or reforming of any kind is allowed. The wheel ID must be recorded and follow the wheel throughout the process in order to assure that the same wheel is returned. A plastic media blast may be used for clean up of the wheel. Hand and/or lathe sanding of the machined surface and the wheel window is allowed. Material removal, though, must be kept to a minimum. Re-machining of the wheel is not allowed. Paint and/or clear coat must not be present on the following surfaces: the nut chamfers, the wheel mounting surfaces and the wheel pilot hole. The refinisher must permanently ID stamp the wheel and warrant the painted/clearcoated surfaces for a minimum of one year or the remainder of the new vehicle warranty, whichever is

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longer.

Important Whenever a wheel is refinished, the mounting surface and the wheel nut contact surfaces must not be painted or clearcoated. Coating these surfaces could affect the wheel nut torque.

When re-mounting a tire on an aluminum wheel, coated balance weights must be used in order to reduce the chance of future cosmetic damage.

Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Wheels and Tires > Wheels > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Wheels: > 06-03-10-010A > Jun > 10 > Wheels - Changing Procedures/Precautions

INFORMATION

Bulletin No.: 06-03-10-010A

Date: June 09, 2010

Subject: Information on Proper Wheel Changing Procedures and Cautions

Models:

2011 and Prior GM Passenger Cars and Trucks 2010 and Prior HUMMER Models 2005-2009 Saab 9-7X 2005-2009 Saturn Vehicles

Attention:

Complete wheel changing instructions for each vehicle line can be found under Tire and Wheel Removal and Installation in Service Information (SI). This bulletin is intended to quickly review and reinforce simple but vital procedures to reduce the possibility of achieving low torque during wheel installation. Always refer to SI for wheel lug nut torque specifications and complete jacking instructions for safe wheel changing.

Supercede: This bulletin is being revised to include the 2011 model year and update the available special tool list. Please discard Corporate Bulletin Number 06-03-10-010 (Section 03 - Suspension).

Frequency of Wheel Changes - Marketplace Driven

Just a few years ago, the increasing longevity of tires along with greater resistance to punctures had greatly reduced the number of times wheels were removed to basically required tire rotation intervals. Today with the booming business in accessory wheels/special application tires (such as winter tires), consumers are having tire/wheel assemblies removed - replaced - or installed more than ever. With this increased activity, it opens up more of a chance for error on the part of the technician. This bulletin will review a few of the common concerns and mistakes to make yourself aware of.

Proper Servicing Starts With the Right Tools

The following tools have been made available to assist in proper wheel and tire removal and installation.

- J 41013 Rotor Resurfacing Kit (or equivalent)

- J 42450-A Wheel Hub Resurfacing Kit (or equivalent)

Corroded Surfaces

One area of concern is corrosion on the mating surfaces of the wheel to the hub on the vehicle. Excessive corrosion, dirt, rust or debris built up on these surfaces can mimic a properly tightened wheel in the service stall. Once the vehicle is driven, the debris may loosen, grind up or be washed away from water splash. This action may result in clearance at the mating surface of the wheel and an under-torqued condition.

Caution

Before installing a wheel, remove any buildup on the wheel mounting surface and brake drum or brake disc mounting surface. Installing wheels with poor metal-to-metal contact at the mounting surfaces can cause wheel nuts to loosen. This may cause a wheel to come off when the vehicle is moving, possibly resulting in a loss of control or personal injury.

Whenever you remove the tire/wheel assemblies, you must inspect the mating surfaces. If corrosion is found, you should remove the debris with a die grinder equipped with a fine sanding pad, wire brush or cleaning disc. Just remove enough material to assure a clean, smooth mating surface.

The J 41013 (or equivalent) can be used to clean the following surfaces:

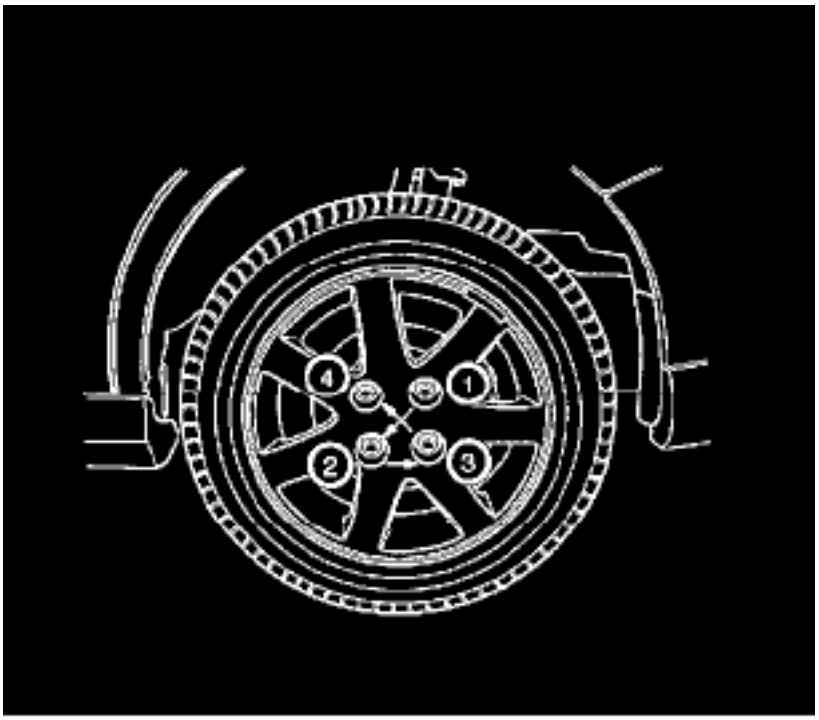
- The hub mounting surface

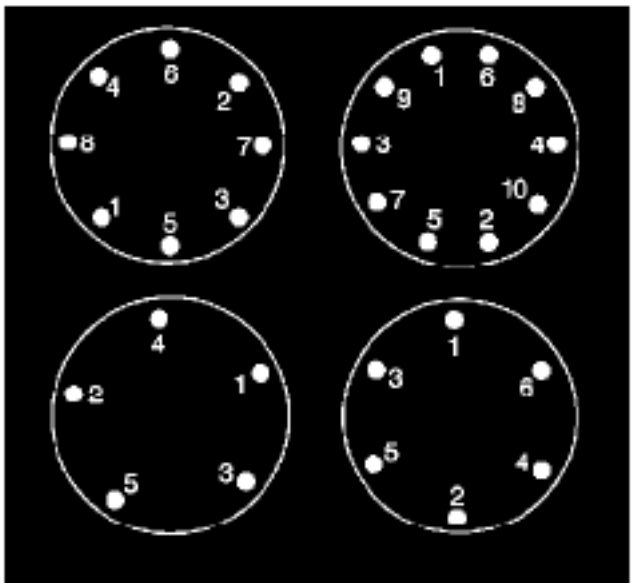
- The brake rotor mounting surface

- The wheel mounting surface

Use the J 42450-A (or equivalent) to clean around the base of the studs and the hub.

Lubricants, Grease and Fluids





Some customers may use penetrating oils, grease or other lubricants on wheel studs to aid in removal or installation. Always use a suitable cleaner/solvent to remove these lubricants prior to installing the wheel and tire assemblies. Lubricants left on the wheel studs may cause improper readings of wheel nut torque. Always install wheels to clean, dry wheel studs ONLY.

Notice

Lubricants left on the wheel studs or vertical mounting surfaces between the wheel and the rotor or drum may cause the wheel to work itself loose after the vehicle is driven. Always install wheels to

clean, dry wheel studs and surfaces ONLY. Beginning with 2011 model year vehicles, put a light coating of grease, GM P/N 1051344 (in Canada, P/N 9930370), on the inner surface of the wheel pilot hole to prevent wheel seizure to the axle or bearing hub.

Wheel Stud and Lug Nut Damage

Always inspect the wheel studs and lug nuts for signs of damage from crossthreading or abuse. You should never have to force wheel nuts down the stud. Lug nuts that are damaged may not retain properly, yet give the impression of fully tightening. Always inspect and replace any component suspected of damage.

Tip

Always start wheel nuts by hand! Be certain that all wheel nut threads have been engaged BEFORE tightening the nut.

Important If the vehicle has directional tread tires, verify the directional arrow on the outboard side of the tire is pointing in the direction of forward rotation.

Wheel Nut Tightening and Torque

Improper wheel nut tightening can lead to brake pulsation and rotor damage. In order to avoid additional brake repairs, evenly tighten the wheel nuts to the proper torque specification as shown for each vehicle in SI. Always observe the proper wheel nut tightening sequence as shown below in order to avoid trapping the wheel on the wheel stud threads or clamping the wheel slightly off center resulting in vibration.

The Most Important Service You Provide

While the above information is well known, and wheel removal so common, technicians run the risk of becoming complacent on this very important

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service operation. A simple distraction or time constraint that rushes the job may result in personal injury if the greatest of care is not exercised. Make it a habit to double check your work and to always side with caution when installing wheels.

Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Wheels and Tires > Wheels > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Wheels: > 00-03-10-006F > May > 10 > Wheels/Tires - Tire Radial Force Variation (RFV)

INFORMATION

Bulletin No.: 00-03-10-006F

Date: May 04, 2010

Subject: Information on Tire Radial Force Variation (RFV)

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X 2000-2005 Saturn L Series 2003-2007 Saturn ION

Supercede: This bulletin is being revised to considerably expand the available information on Radial Force Variation (RFV) and should be reviewed in whole. Please discard Corporate Bulletin Number 00-03-10-006E (Section 03 - Suspension).

Important

- Before measuring tires on equipment such as the Hunter GSP9700, the vehicle MUST be driven a minimum of 16 km (10 mi) to ensure removal of any flat-spotting. Refer to Corporate Bulletin Number 03-03-10-007E - Tire/Wheel Characteristics of GM Original Equipment Tires.

- Equipment such as the Hunter GSP9700 MUST be calibrated prior to measuring tire/wheel assemblies for each vehicle.

The purpose of this bulletin is to provide guidance to GM dealers when using tire force variation measurement equipment, such as the Hunter GSP9700. This type of equipment can be a valuable tool in diagnosing vehicle ride concerns. The most common ride concern involving tire radial force variation is highway speed shake on smooth roads.

Tire related smooth road highway speed shake can be caused by three conditions: imbalance, out of round and tire force variation. These three conditions are not necessarily related. All three conditions must be addressed.

Imbalance is normally addressed first, because it is the simpler of the three to correct. Off-vehicle, two plane dynamic wheel balancers are readily available and can accurately correct any imbalance. Balancer calibration and maintenance, proper attachment of the wheel to the balancer, and proper balance weights, are all factors required for a quality balance. However, a perfectly balanced tire/wheel assembly can still be "oval shaped" and cause a vibration.

Before balancing, perform the following procedures.

Tire and Wheel Diagnosis

1. Set the tire pressure to the placard values. 2. With the vehicle raised, ensure the wheels are centered on the hub by loosening all wheel nuts and hand-tightening all nuts first by hand while

shaking the wheel, then torque to specifications using a torque wrench, NOT a torque stick.

3. Visually inspect the tires and the wheels. Inspect for evidence of the following conditions and correct as necessary:

- Missing balance weights

- Bent rim flange

- Irregular tire wear

- Incomplete bead seating

- Tire irregularities (including pressure settings)

- Mud/ice build-up in wheel

- Stones in the tire tread

- Remove any aftermarket wheels and/or tires and restore vehicle to original condition prior to diagnosing a smooth road shake condition.

4. Road test the vehicle using the Electronic Vibration Analyzer (EVA) essential tool. Drive for a sufficient distance on a known, smooth road

surface to duplicate the condition. Determine if the vehicle is sensitive to brake apply. If the brakes are applied lightly and the pulsation felt in the steering wheel increases, refer to the Brakes section of the service manual that deals with brake-induced pulsation. If you can start to hear the vibration as a low boom noise (in addition to feeling it), but cannot see it, the vehicle likely has a first order (one pulse per propshaft revolution) driveline vibration. Driveline first order vibrations are high enough in frequency that most humans can start to hear them at highway speeds, but are too high to be able to be easily seen. These issues can be caused by driveline imbalance or misalignment. If the vehicle exhibits this low boom and the booming pulses in-and-out on a regular basis (like a throbbing), chances are good that the vehicle could have driveline vibration. This type

P-Metric tires of passenger cars	18 lbs (8 kg) or less
P-Metric tires on light trucks	24 lbs (11 kg) or less
LT-tires on light trucks	35 lbs (16 kg) or less

of vibration is normally felt more in the "seat of the pants" than the steering wheel.

5. Next, record the Hertz (Hz) reading as displayed by the EVA onto the tire data worksheet found at the end of this bulletin. This should be done

after a tire break-in period of at least 16 km (10 mi) at 72 km/h (45 mph) or greater, in order to eliminate any possible tire flat-spotting. This reading confirms what the vehicle vibration frequency is prior to vehicle service and documents the amount of improvement occurring as the result of the various steps taken to repair. Completing the Steering Wheel Shake Worksheet below is required. A copy of the completed worksheet must be saved with the R.O. and a copy included with any parts returned to the Warranty Parts Center for analysis. A reading of 35 to 50 Hz typically indicates a first order propshaft vibration. If this is the situation, refer to Corporate Bulletin Number 08-07-30-044D. Generally, a reading between 10 and 20 Hz indicates a tire/wheel vibration and if this is the reading obtained, continue using this bulletin. If the tire 1st order vibration goes away and stays away during this evaluation, the cause is likely tire flat-spotting. Tire flat-spotting vibration may come and go at any speed over 72 km/h (45 mph) during the first 10 minutes of operation, if vibration continues after 10 minutes of driving at speeds greater than 72 km/h (45 mph), tire flat-spotting can be ruled out as the cause for vibration.

6. If flat-spotting is the cause, provide the explanation that this has occurred due to the vehicle being parked for long periods of time and that the

nature of the tire is to take a set. Refer to Corporate Bulletin Number 03-03-10-007E: Information on Tire/Wheel Characteristics (Vibration, Balance, Shake, Flat Spotting) of GM Original Equipment Tires.

7. If the road test indicates a shake/vibration exists, check the imbalance of each tire/wheel assembly on a known, calibrated, off-car dynamic

balancer.Make sure the mounting surface of the wheel and the surface of the balancer are absolutely clean and free of debris. Be sure to chose the proper cone/collet for the wheel, and always use the pilot bore for centering. Never center the wheel using the hub-cap bore since it is not a precision machined surface. If any assembly calls for more than 1/4 ounce on either rim flange, remove all balance weights and rebalance to as close to zero as possible. If you can see the vibration (along with feeling it) in the steering wheel (driving straight without your hands on the wheel), it is very likely to be a tire/wheel first order (one pulse per revolution) disturbance. First order disturbances can be caused by imbalance as well as non-uniformities in tires, wheels or hubs. This first order frequency is too low for a human to hear, but if the amplitude is high enough, it can be seen.

If a vibration or shake still exists after balancing, any out of round conditions, of the wheel, and force variation conditions of the tire, must be addressed. Equipment such as the Hunter GSP9700 can address both (it is also a wheel balancer).

Tire radial force vibration (RFV) can be defined as the amount of stiffness variation the tire will produce in one revolution under a constant load. Radial force variation is what the vehicle feels because the load (weight) of the vehicle is always on the tires. Although free runout of tires (not under load) is not always a good indicator of a smooth ride, it is critical that total tire/wheel

assembly runout be within specification.

Equipment such as the Hunter GSP9700 loads the tire, similar to on the vehicle, and measures radial force variation of the tire/wheel assembly. Note that the wheel is affecting the tire's RFV measurement at this point. To isolate the wheel, its runout must be measured. This can be easily done on the Hunter, without the need to set up dial indicators. If the wheel meets the runout specification, the tire's RFV can then be addressed.

After measuring the tire/wheel assembly under load, and the wheel alone, the machine then calculates (predicts) the radial force variation of the tire. However, because this is a prediction that can include mounting inaccuracies, and the load wheel is much smaller in diameter than used in tire production, this type of service equipment should NOT be used to audit new tires. Rather, it should be used as a service diagnostic tool to minimize radial force variation of the tire/wheel assembly.

Equipment such as the Hunter GSP9700 does an excellent job of measuring wheel runout, and of finding the low point of the wheel (for runout) and the high point of the tire (for radial force variation). This allows the tire to be matched mounted to the wheel for lowest tire/wheel assembly force variation.

The machine will simplify this process into easy steps. The following assembly radial force variation numbers should be used as a guide:

When measuring RFV and match mounting tires perform the following steps.

Measuring Wheel Runout and Assembly Radial Force Variation

Important The completed worksheet at the end of this bulletin must be attached to the hard copy of the repair order.

- Measure radial force variation and radial runout.

- If a road force/balancing machine is used, record the radial force variation (RFV) on the worksheet at the end of this bulletin. It may be of benefit to have the lowest RFV assembly to the front left corner. If the machine is not available and the EVA data suggests there is an issue, swap the tire and wheel assemblies from the front to the back. Re-check on the EVA and if the problem still exists, test another vehicle to find tires that do not exhibit the same frequency and swap those tires onto the subject vehicle.

- If a runout/balancing machine is used, record the radial runout of the tire/wheel assemblies on the worksheet at the end of this bulletin. If one or more of the tire/wheel assemblies are more than.040 in (1.02 mm), match mount the tire to the wheel to get below.040 in (1.02 mm). For sensitive customers, readings of 0.030 inch (0.76 mm) or less are preferable, it may also be of benefit to have the lowest runout assembly to the front left corner. If the machine is not available and the EVA data suggests there is an issue, swap the tire and wheel assemblies from the front to the back. Re-check on the EVA and if the problem still exists, test another vehicle to find tires that do not exhibit the same frequency and swap those tires

onto the subject vehicle.

- After match mounting, the tire/wheel assembly must be rebalanced.

If match mounting tires to in-spec wheels produces assembly values higher than these, tire replacement may be necessary. Replacing tires at lower values will probably mean good tires are being condemned. Because tires can sometimes become temporarily flat-spotted, which will affect force variation, it is important that the vehicle be driven at least 16 km (10 mi) prior to measuring. Tire pressure must also be adjusted to the usage pressure on the vehicle's tire placard prior to measuring.

Most GM vehicles will tolerate radial force variation up to these levels. However, some vehicles are more sensitive, and may require lower levels. Also, there are other tire parameters that equipment such as the Hunter GSP9700 cannot measure that may be a factor. In such cases, TAC should be contacted for further instructions.

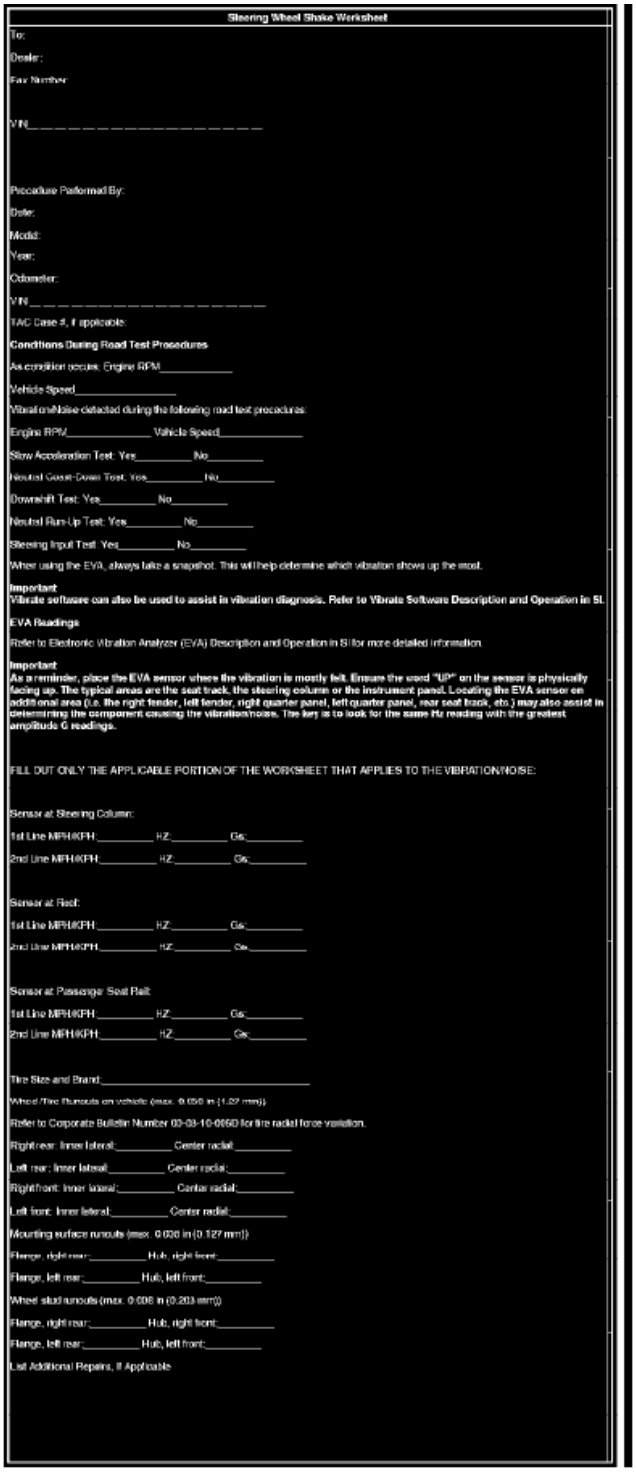
Important

- When mounting a GM wheel to a wheel balancer/force variation machine, always use the wheel's center pilot hole. This is the primary centering mechanism on all GM wheels; the bolt holes are secondary. Usually a back cone method to the machine should be used. For added accuracy and repeatability, a flange plate should be used to clamp the wheel onto the cone and machine. This system is offered by all balancer manufacturers in GM's dealer program.

- Any type of service equipment that removes tread rubber by grinding, buffing or truing is NOT recommended, and may void the tire warranty. However, tires may have been ground by the tire company as part of their tire manufacturing process. This is a legitimate procedure.

Steering Wheel Shake Worksheet

When diagnosing vibration concerns, use the following worksheet in conjunction with the appropriate Vibration Analysis-Road testing procedure in the Vibration Correction sub-section in SI.



Steering Wheel Shake Worksheet

To:

Dealer:

Fax Number:

VIN_ _

Procedure Performed By:

Date:

Model:

Year:

Odometer:

VIN_ _

TAC Case #, if applicable:

Conditions During Road Test Procedures

As condition occurs: Engine RPM_____

Vehicle Speed_____

Vibration/Noise detected during the following road test procedures:

Engine RPM_____ Vehicle Speed_____

Slow Acceleration Test: Yes_____ No_____

Neutral Coast-Down Test: Yes_____ No_____

Downshift Test: Yes_____ No_____

Neutral Run-Up Test: Yes_____ No_____

Steering Input Test: Yes_____ No_____

When using the EVA, always take a snapshot. This will help determine which vibration shows up the most.

Important
Vibrate software can also be used to assist in vibration diagnosis. Refer to Vibrate Software Description and Operation in SI.

EVA Readings

Refer to Electronic Vibration Analyzer (EVA) Description and Operation in SI for more detailed information.

Important
As a reminder, place the EVA sensor where the vibration is mostly felt. Ensure the word "UP" on the sensor is physically facing up. The typical areas are the seat track, the steering column or the instrument panel. Locating the EVA sensor on additional area (i.e. the right fender, left fender, right quarter panel, left quarter panel, rear seat track, etc.) may also assist in determining the component causing the vibration/noise. The key is to look for the same Hz reading with the greatest amplitude G readings.

FILL OUT ONLY THE APPLICABLE PORTION OF THE WORKSHEET THAT APPLIES TO THE VIBRATION/NOISE:

Sensor at Steering Column:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Sensor at Rear:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Sensor at Passenger Seat Rail:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Tire Size and Brand:_____

Wheel/Tire Runouts on vehicle (max. 0.050 in (1.27 mm))

Refer to Corporate Bulletin Number 03-03-10-006D for tire radial force variation.

Right rear: Inner lateral:_____ Center radial:_____

Left rear: Inner lateral:_____ Center radial:_____

Right front: Inner lateral:_____ Center radial:_____

Left front: Inner lateral:_____ Center radial:_____

Mounting surface runouts (max. 0.005 in (0.127 mm))

Flange, right rear:_____ Hub, right front:_____

Flange, left rear:_____ Hub, left front:_____

Wheel stud runouts (max. 0.008 in (0.203 mm))

Flange, right rear:_____ Hub, right front:_____

Flange, left rear:_____ Hub, left front:_____

List Additional Repairs, If Applicable:

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Refer to the appropriate section of SI for specifications and repair procedures that are related to the vibration concern.

Disclaimer

TECHNICAL

Bulletin No.: 05-03-10-003F

Date: April 27, 2010

Subject: Low Tire Pressure, Leaking Cast Aluminum Wheels (Repair with Adhesive Sealant)

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X with Cast Aluminum Wheels

Supercede: This bulletin is being revised to update the model years and the bulletin reference information. Please discard Corporate Bulletin Number 05-03-10-003E (Section 03 - Suspension).

Condition

Some customers may comment on a low tire pressure condition.

Diagnosis of the low tire pressure condition indicates an air leak through the cast aluminum wheel.

Cause

Porosity in the cast aluminum wheel may be the cause.

Notice

This bulletin specifically addresses issues related to the wheel casting that may result in an air leak. For issues related to corrosion of the wheel in service, please refer to Corporate Bulletin Number 08-03-10-006C - Tire Slowly Goes Flat, Tire Air Loss, Low Tire Pressure Warning Light Illuminated, Aluminum Wheel Bead Seat Corrosion (Clean and Resurface Wheel Bead Seat).

Correction

1. Remove the tire and wheel assembly from the vehicle. Refer to the appropriate service procedure in SI. 2. Locate the leaking area by inflating the tire to 276 kPa (40 psi) and dipping the tire/wheel assembly in a water bath, or use a spray bottle with soap

and water to locate the specific leak location.

Important

- If the porosity leak is located in the bead area of the aluminum rim (where the tire meets the rim), the wheel should be replaced.

- If two or more leaks are located on one wheel, the wheel should be replaced.

3. If air bubbles are observed, mark the location.

- If the leak location is on the tire/rubber area, refer to Corporate Bulletin Number 04-03-10-001F - Tire Puncture Repair Procedures for All Cars and Light Duty Trucks.

- If the leak is located on the aluminum wheel area, continue with the next step.

4. Inscribe a mark on the tire at the valve stem in order to indicate the orientation of the tire to the wheel. 5. Dismount the tire from the wheel. Refer to Tire Mounting and Dismounting. 6. Remove the tire pressure sensor. Refer to Tire Pressure Sensor removal procedure in SI. 7. Scuff the INSIDE rim surface at the leak area with #80 grit paper and clean the area with general purpose cleaner, such as 3M(R) General Purpose

Adhesive Cleaner, P/N 08984, or equivalent.

8. Apply a 3 mm (0.12 in) thick layer of Silicone - Adhesive/Sealant, P/N 12378478 (in Canada, use 88900041), or equivalent, to the leak area. 9. Allow for the adhesive/sealant to dry.

Notice Caution must be used when mounting the tire so as not to damage the sealer. Damaging the repair area may result in an air leak.

Part Number	Description
12378478 (in Canada, use 88900041)	Silicone - Adhesive/Sealant
3M(R) 08984	3M(R) General Purpose Adhesive Cleaner

Labor Operation	Description	Labor Time
E0420	Wheel - One - R&R Or Replace	Use Published Labor operation Time
Add:	To Repair Porosity On Aluminum Wheel	
Add:	To Repair Each Additional Wheel	

Labor Operation	Description	Failed Object	Fault/Reason	Location Code	Warranty Type	Repair/Action Code	Labor Time
7711001	Wheel - One - R&R Or Replace	77110	55	3-left 4-right 5-all	01	05	Use Published Labor Operation Time
add 7711003	To Repair Porosity On Aluminum Wheel	-	-	-	-	-	0.1 hr
add 7711002	To Repair Each Additional Wheel	-	-	-	-	-	Use Published Labor Operation Time

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10. Align the inscribed mark on the tire with the valve stem on the wheel. 11. Reinstall the Tire Pressure Sensor. Refer to Tire Pressure Sensor installation procedure in SI. 12. Mount the tire on the wheel. Refer to Tire Mounting and Dismounting. 13. Pressurize the tire to 276 kPa (40 psi) and inspect for leaks. 14. Adjust tire pressure to meet the placard specification. 15. Balance the tire/wheel assembly. Refer to Tire and Wheel Assembly Balancing - Off-Vehicle. 16. Install the tire and wheel assembly onto the vehicle. Refer to the appropriate service procedure in SI.

Parts Information

Warranty Information (excluding Saab U.S. Models)

Important The Silicone - Adhesive/Sealant comes in a case quantity of six. ONLY charge warranty one tube of adhesive/sealant per wheel repair.

For vehicles repaired under warranty, use:

One leak repair per wheel.

Warranty Information (Saab U.S. Models)

For vehicles repaired under warranty, use the table above.

Disclaimer

Part Number	Description
12377966 (in Canada, 10952905)	GM Vehicle Care Cleaner Wax 16 fl oz (.473 L)

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Wheels: All Technical Service Bulletins Wheels - Chrome Wheel Brake Dust Accumulation/Pitting

Bulletin No.: 04-03-10-012B

Date: February 01, 2008

INFORMATION

Subject: Pitting and Brake Dust on Chrome wheels

Models: 2008 and Prior GM Passenger Cars and Trucks (including Saturn) 2008 and Prior HUMMER H2, H3 2005-2008 Saab 9-7X

Supercede:

This bulletin is being revised to add model years. Please discard Corporate Bulletin Number 04-03-10-012A (Section 03 - Suspension).

Analysis of Returned Wheels

Chrome wheels returned under the New Vehicle Limited Warranty for pitting concerns have recently been evaluated. This condition is usually most severe in the vent (or window) area of the front wheels. This "pitting" may actually be brake dust that has been allowed to accumulate on the wheel. The longer this accumulation builds up, the more difficult it is to remove.

Cleaning the Wheels

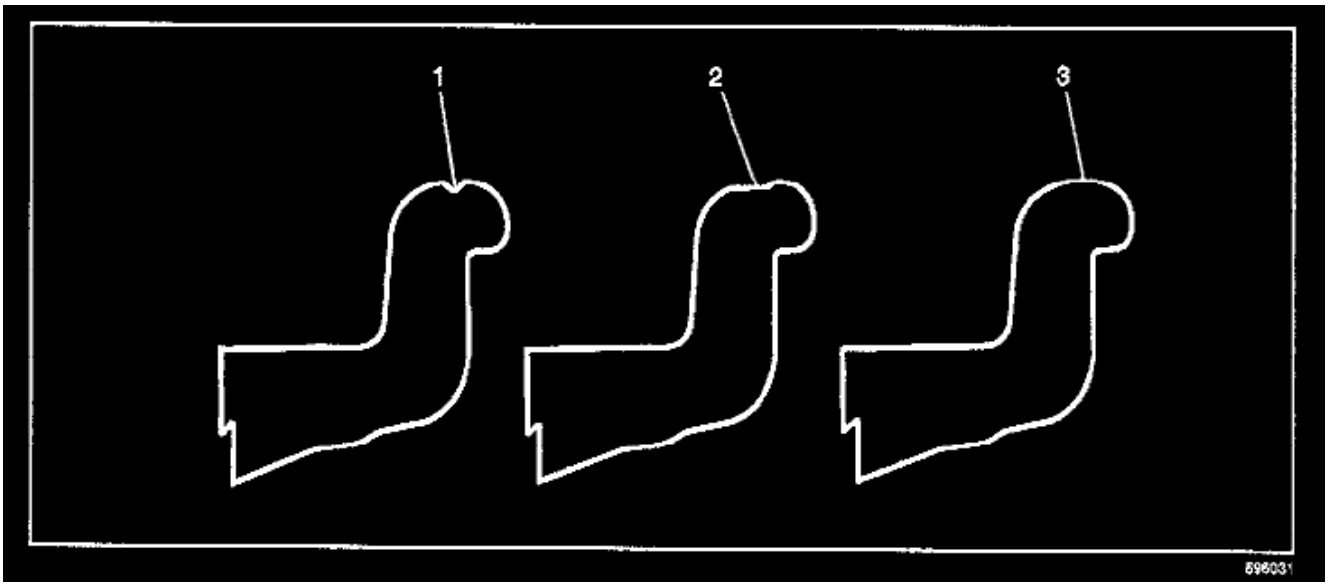
In all cases, the returned wheels could be cleaned to their original condition using GM Vehicle Care Cleaner Wax, P/N 12377966 (in Canada, P/N 10952905). When using this product, you should confine your treatment to the areas of the wheel that show evidence of the brake dust build-up. This product is only for use on chromed steel or chromed aluminum wheels.

Parts Information

Warranty Information

Wheel replacement for this condition is NOT applicable under the terms of the New Vehicle Limited Warranty.

Disclaimer



Wheels: All Technical Service Bulletins Warranty - OE Chrome Plated Aluminum Wheel ID

File In Section: 03 - Suspension

Bulletin No.: 99-03-10-102

Date: June, 1999

INFORMATION

Subject: Original Equipment Chrome Plated Aluminum Wheel Identification

Models: 1999 and Prior Passenger Cars and Light Duty Trucks

Chrome plated aluminum wheels have been returned to the Warranty Parts Center that are not the original equipment (OE) components.

Original equipment chrome plated aluminum wheels can be identified by either a balance weight clip retention groove (1) or a step (2) that is machined around both of the wheel's rim flanges. The rim flanges (3) of painted original equipment aluminum wheels do not have a groove or a step.

Chrome plated aluminum wheels that do not have the wheel rim flange groove or step are aftermarket chrome plated components and are NOT warrantable. Any aftermarket chrome wheels received by the Warranty Parts Center will be charged back to the dealership.

Wheels: All Technical Service Bulletins Wheels - Sealing Leaking Cast Aluminum

Bulletin Number: 93-3-16 Reference Number: 393504 Publish Date: 7/93

Subject: LEAKING CAST ALUMINUM WHEELS (REPAIR WITH ADHESIVE SEALANT)

Models Affected: 1985-1993 ALL MODELS

Should a vehicle equipped with cast aluminum wheels exhibit a slow leak due to a porous condition existing in the wheel, the wheel can be repaired by using Dow Corning Silastic 732 RTV, p/n 1052366 or equivalent, as described in the following procedure:

1. Remove tire-wheel assembly from vehicle.

2. Locate leaking area by inflating tire to 40 psi and dipping tire-wheel assembly in water bath.

3. If air bubbles are observed, mark leak area and remove tire from wheel.

4. Scuff INSIDE rim surface at leak area with # 80 grit paper and clean area with general purpose cleaner, such as 3M # 08984.

5. Apply 1/8" thick layer of adhesive/sealant to leak area on INSIDE of rim and allow six hours of drying time.

6. Mount tire on wheel, pressurizing to 40 psi and check for leaks.

NOTICE:

Caution must be used when mounting the tire so as not to damage the sealer.

7. Adjust tire pressure to meet placard specification.

8. Balance tire-wheel assembly, using proper coated weights.

9. Water test wheel again.

10. Reinstall tire-wheel assembly on vehicle.

Parts are currently available from GMSPO.

WARRANTY INFORMATION:

Labor Operation Number: E0420

BALANCE WEIGHT USAGE FOR LIGHT TRUCK ALUMINUM WHEELS

	AW series (coated)	MC series (coated)
1988 - 1991 C/K truck	X	
1992 - 1993 C/K truck		X
1985 - 1991 R/V truck	X	
1985 - 1992 M/L van	X	
1993 M/L van		X
1985 - 1993 G van	X	
1985 - 1993 S/T truck	X	

TYPE "AW"

TYPE "MC"

Wheels: All Technical Service Bulletins Wheels - Finish Damage During Off Car Balancing

BULLETIN NUMBER: 93-3E-67 SECTION: 3E Wheels & Tires

NUMBER: 3

CORPORATE REFERENCE NUMBER: 3935O2R

DATE: June 1993

SUBJECT: INFORMATION ON COSMETIC DAMAGE TO ALUMINUM WHEELS DURING BALANCING

MODELS: 1985-93 MODELS WITH ALUMINUM WHEELS

Some aluminum wheels on GM models may incur cosmetic damage during balancing if proper care and procedures are not used. All aluminum wheels have a clearcoat paint on them that must be cared for like any other painted surface.

Some off-car vehicle balancer retaining cups used to clamp the wheel to the balancer may put a circular mark into the clearcoat on the face of the wheel. Like any other clearcoat damage, this may be difficult to remove or repair, depending on severity.

ALWAYS use balancer retainer cups that are protected with rubber, plastic, or other nonmetallic materials where contact is made with the wheel. Make

sure the retainer cup is tree from dirt, grease, and gouges. Most wheel balancers now offer this type of protected retainer.

DO NOT allow the retainer cup to rotate against the wheel's surface when tightening the wheel to the balancer.

DO NOT OVERTIGHTEN. Most balancers use a large "wing nut" design to clamp the retainer against the wheel. Hand tight is sufficient.

This procedure will allow accurate balancing using the conventional back cone method.

Important:

Coated balance weights must be used on aluminum wheels to prevent damage to the rim flange.

Except for the N9O 4X4 wheel used on T trucks, all light truck aluminum wheels will accept either "AW" series or "MO" series clip-on coated weights on both the inside and outside rim flanges. The N9O T truck wheel will accept "AW" series weights on the inside rim flange only. The outside rim flange is not designed to accept a clip-on weight. If such a weight installation is attempted, a poor fit will result, and the weight may fall off and/or cause cosmetic damage to the rim flange. This wheel can be 1) static balanced by clipping all the weight on the inside rim flange (as is done in the assembly plant), or 2) dynamic balanced by clipping a weight on the inside flange and using an adhesive weight near the outside flange.

The charts show "AW" and "MC" balance weight usage. These original equipment coated weights are available at competitive prices through the GM Dealer Equipment program.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Wheels and Tires > Wheels > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Wheels: > 922323E > Jun > 92 > Wheels (Steel) - Damage Due to Improper Mounting

Number: 92-232-3E

Section: 3E

Date: JUNE 1992

Corporate Bulletin No.: 233002

ASE No.: A4

Subject: AVOIDING DAMAGE TO STEEL WHEELS FROM IMPROPER WHEEL/TIRE CHANGING TECHNIQUES

Model and Year: 1983-92 ALL PASSENGER CARS AND TRUCKS WITH STEEL WHEELS

It is important to use proper procedures to prevent damage to either the tire mounting surface or the wheel mounting holes. Damage can result from the improper wheel attachment or tire mounting techniques on vehicles with steel wheels.

1. IMPROPER TIRE CHANGING TECHNIQUES:

It takes about 70 seconds for the air to completely exhaust from a large tire. If the technician doesn't wait this amount of time after removing the valve core, the bead breaker on the tire change could put enough force on the tire to bend the wheel at the mounting surface. Such damage can result in vibration, shimmy, and under severe usage (i.e. police vehicle) lead to cracking.

2. OVER TORQUING OF THE WHEEL NUTS:

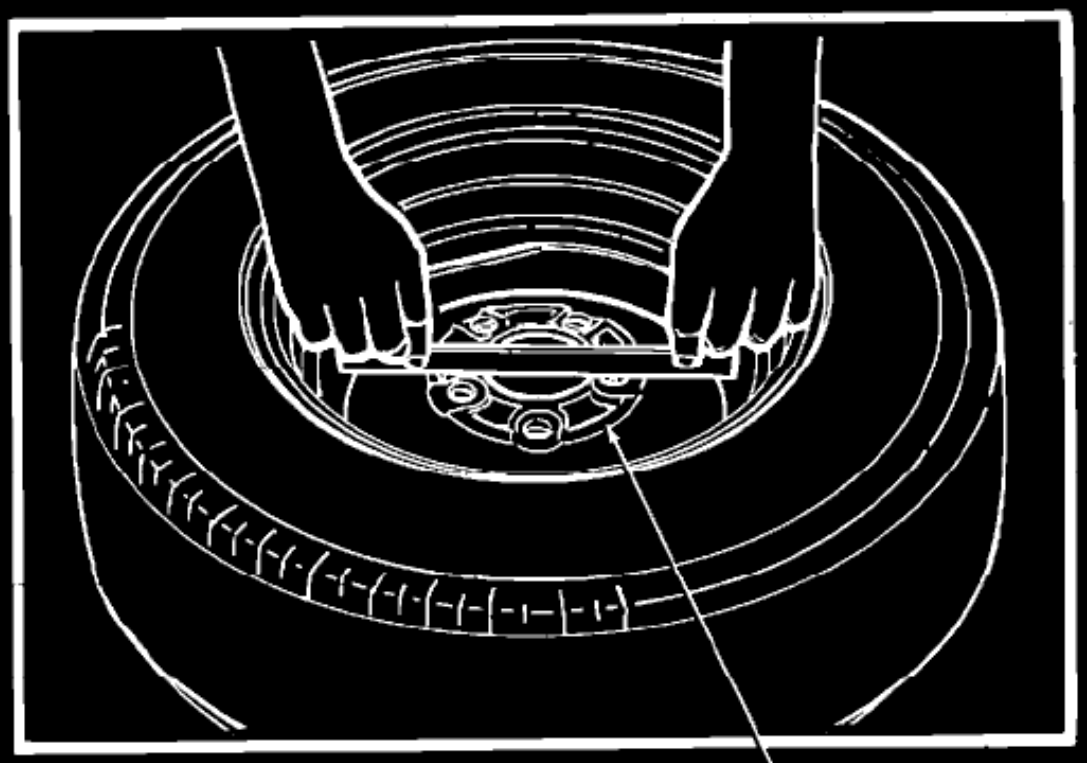
The service specification for wheel nuts is listed in the Service Manuals. Some wheels have been observed with wheel nuts that were over torqued by as much as 50 percent. This may damage the wheel mounting holes and may also lead to cracks.

I. PROPER TIRE CHANGING TECHNIQUES:

Completely deflate the tire before attempting to break the tire bead loose.

MOUNTING SURFACE CHECKING PROCEDURE

STRAIGHT EDGE PROCEDURE

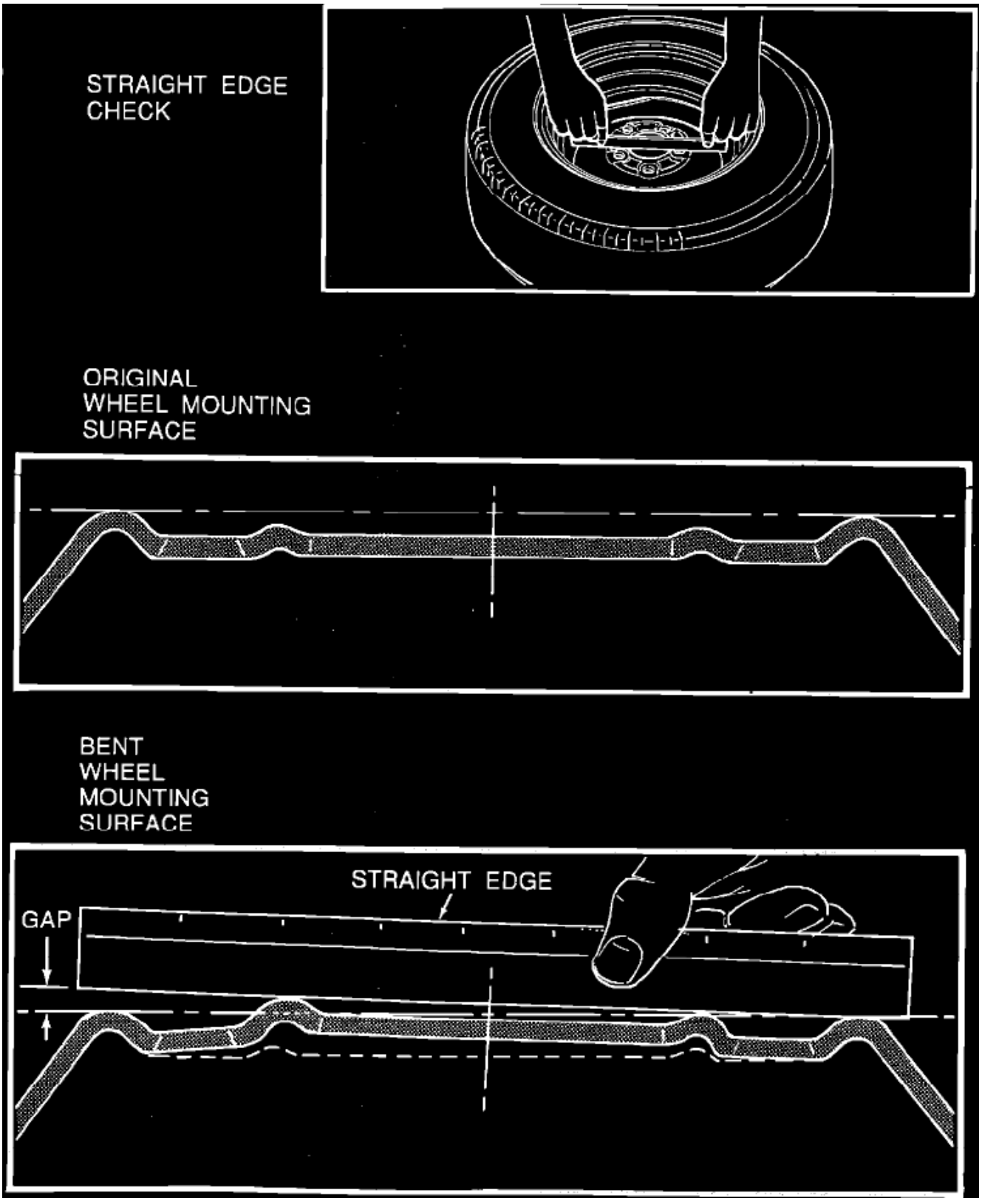


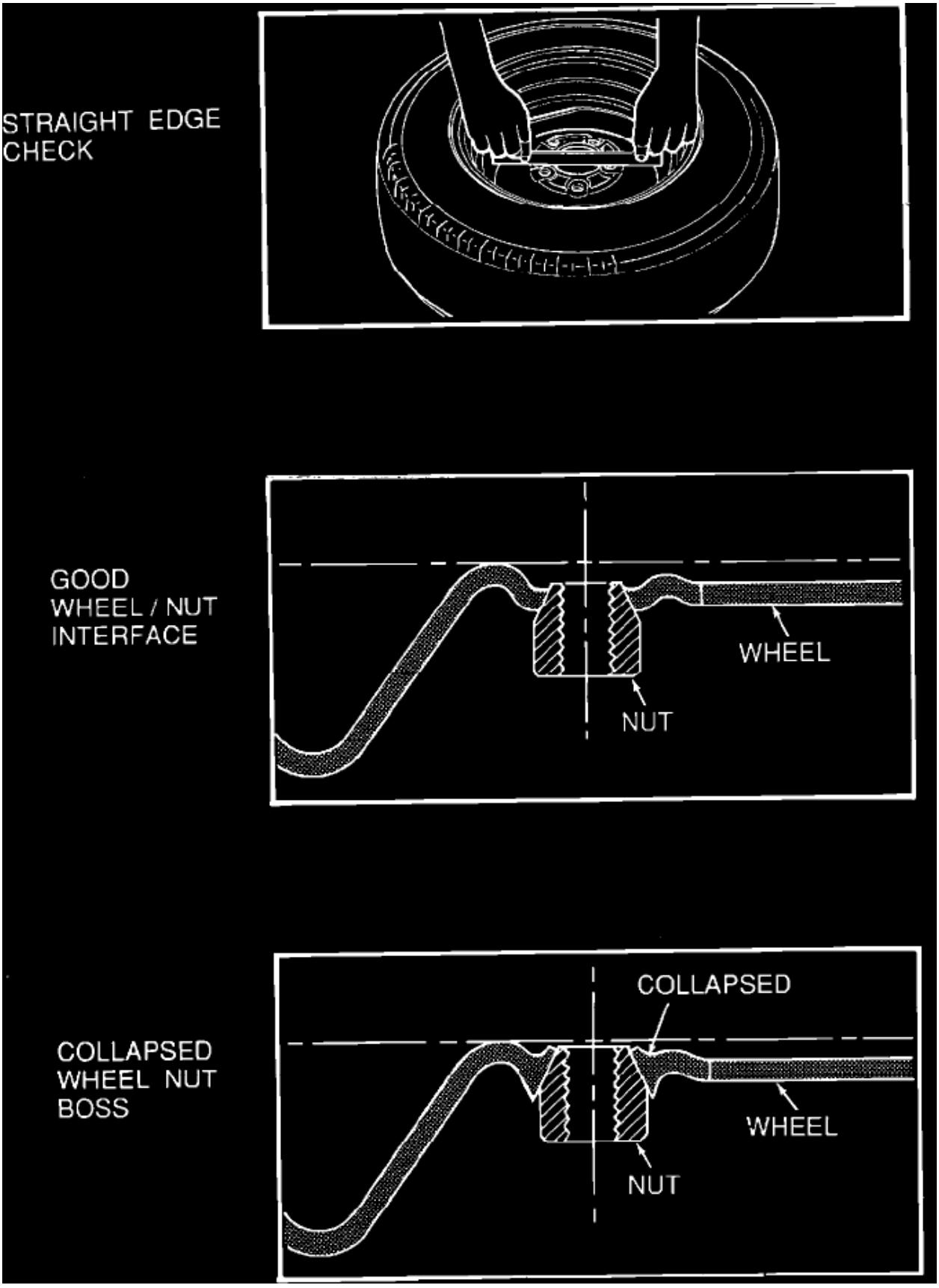
A. Obtain a straight edge approximately 8 - 9 inches long and, while holding it in two hands as shown, place it on the mounting surface of the wheel and try to rock it up and down.

B. Repeat the above procedure on three or four different positions on the wheel mounting surface.

C. The outer ring of the mounting surface is normally raised above everything inside it. If a wheel mounting surface has been bent on a tire changer, it will be raised above the outer ring and the straight edge will rock on this "raised" portion.

D. If a bent wheel is found, it must be replaced.


STRAIGHT EDGE CHECK
ORIGINAL WHEEL MOUNTING SURFACE
BENT WHEEL MOUNTING SURFACE
STRAIGHT EDGE
GAP



A. Obtain a straight edge approximately 8-9 inches long and, while holding it in two hands, as shown in the attached illustration, place it on the inboard mounting surface of the wheel and try to

rock it up and down.

B. Repeat the above procedure on three or four different positions on the wheel inboard mounting surface.

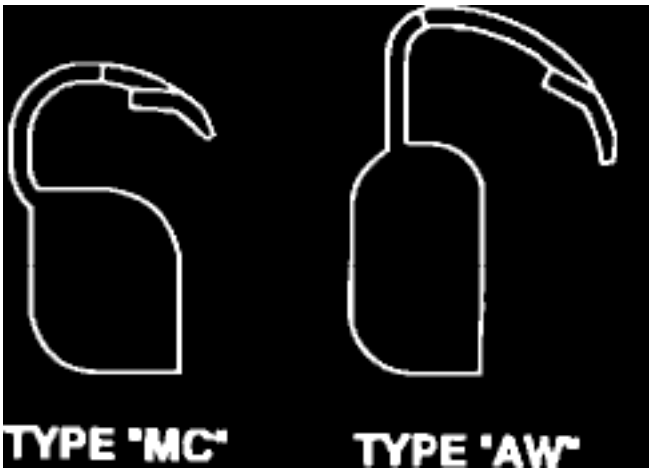
C. The outer ring of the mounting surface is normally raised above everything inside it. If a wheel mounting surface has been bent on a tire changer, it will be raised above the outer ring and the straight edge will rock on this "raised" portion.

D. If a bent wheel is found, it must be replaced.

II. OVER TORQUING OF WHEEL NUTS:

1. A TORQUE WRENCH MUST BE USED to insure that the wheel nuts are tightened to specification. This should be done in two steps using the star pattern. First, snug the nuts down by hand. Then, using the star pattern and a torque wrench, tighten the wheel nuts to about half the final torque. Finally, tighten the wheel nuts to specification using the star pattern and a torque wrench.

2. NEVER use lubricants or penetrating fluids on wheel studs, nuts, or mounting surfaces, as this can raise the actual torque on the nut without a corresponding torque reading on the wrench. Wheel nuts, studs, and mounting surfaces must be clean and dry.



Wheels: All Technical Service Bulletins Aluminum Wheels - New Coated Wheel Weights

Number: 91-35-3E

Section: 3E

Date: August 1990

Corporate Bulletin No.: 003502

Subject: COATED WHEEL WEIGHTS FOR ALUMINUM WHEELS

Model and Year: 1985-91 MODELS WITH CAST ALUMINUM WHEELS

TO: ALL CHEVROLET DEALERS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 89-65-3E, DATED JANUARY 1989. POLYESTER COATED WHEEL WEIGHTS NOW AVAILABLE FROM GMSPO. THE 1990-91 MODEL YEARS HAVE ALSO BEEN ADDED. ALL COPIES OF 89-65-3E SHOULD BE DISCARDED.

Vehicles with cast aluminum wheels use a coated clip on wheel weight. The coating has recently changed from nylon to polyester, giving a more natural appearance that more closely matches the wheel. Coated balance weights are used on both the inboard and outboard rim flanges. They will not discolor, corrode or damage the appearance of the wheel as may have been the case in the past with uncoated clip on weights. These coated weights will fit most GM cast aluminum wheels.

There are two types of coated wheel weights available to fit the GM vehicles (see illustration). Both types of weights are available from GMSPO in 1/4 ounce increments. See usage chart below to determine which type weight is correct for the vehicle.

"MC" Type Weight Used On:

1990-1991 "W" Car

1988-1990 "Y" Car "AW" Type Weight

1989-1991 "L" Car Used On All Other

1991 "B" Car, "U" Van Series Vehicles

1/4 oz. P/N 9591670 P/N 9591669

1/2 oz. 9591584 9591582

3/4 oz. 9591585 9591583

1-1/4 oz. 9591378 9591362

1-1/2 oz. 9591379 9591363

1-3/4 oz. 9591380 9591364

2 oz. 9591381 9591365

"MC" Type Weight Used On:

1990-1991 "W" Car

1988-1990 "Y" Car "AW" Type Weight

1989-1991 "L" Car Used On All Other

1991 "B" Car, "U" Van Series Vehicles

2-1/4 oz. 9591382 9591366

2-1/2 oz. 9591383 9591367

3oz. 9591385 9591369

Parts are currently available from GMSPO.

Dealers should make sure they have a supply of both types weights for balancing GM aluminum wheels.

When installing the coated weights, care must be taken so that the coating does not crack. It is recommended that a Teflon tipped hammer be used, such as 85403 Nicholson Industrial Hammer, their part number CAS 3340551, available through the Charles Strelinger Company, Warren, Mi (313-268-4100), or equivalent.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Wheels and Tires > Wheels > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Wheels: > 8537 > Feb > 85 > Wheels - Locking Wheel Nuts Impact On Tire Balance

85-37 3E (X) FEB., 1985 Subject:

LOCKING WHEEL NUTS

Model and Year: ALL

TO: ALL CHEVROLET DEALERS

Whenever a heavier, solid locking wheel nut is used to replace a standard nut, it should be installed nearest the valve stem, and a 1/2 ounce balance weight should be added 180~ opposite the locking nut.

This situation will usually occur on styled wheels. For improved appearance, the balance weight should be installed on the wheel's inboard side.

When rotating tires, always re-install the locking nut nearest the tire valve stem so that it remains opposite the 1/2 ounce balance weight.

This procedure will improve the on-car wheel balance by compensating for the heavy locking wheel nut. This does not apply to the light weight, two-piece locking nuts used on some Chevrolet models.

Wheels: All Technical Service Bulletins Recall - Firestone Steel Wheels Cracking

Number: 85C02

Section: 3E

Date: October, 1984

Subject: PRODUCT SAFETY CAMPAIGN 85C02 FIRESTONE 16 X 6 DISC WHEEL MAY CRACK

Model and Year: 1984-1985 CHEVROLET C/K30 CHASSIS-CAB MODELS EQUIPPED WITH RPO R05 (DUAL REAR WHEELS)

TO: ALL CHEVROLET DEALERS

The National Traffic and Motor Vehicle Safety Act, as amended, provides that each vehicle which is subject to a recall campaign of this type must be adequately repaired within a reasonable time after the owner has tendered it for repair. A failure to adequately repair within 60 days after tender of a vehicle is prima facie evidence of failure to repair within a reasonable time.

If the condition is not adequately repaired within a reasonable time, the owners may be entitled to an identical or reasonably equivalent vehicle at no charge or to a refund of the purchase price less a reasonable allowance for depreciation.

To avoid having to provide these burdensome solutions, every effort must be made to promptly schedule an appointment with each owner and to repair their vehicle as soon as possible. As you will see in reading the attached copy of the letter which is being sent to owners, the owners are being instructed to contact the nearest Chevrolet Zone Office if their dealer does not remedy the condition within five days of the agreed service date. If the condition is not remedied within a reasonable time, they are instructed on how to contact the National Highway Traffic Safety Administration.

DEFECT INVOLVED

General Motors has been notified by Firestone Steel Products that a defect which relates to motor vehicle safety exists in some Firestone Steel Products 16 X 6 disc wheels, which were installed on some 1984- 1985 Chevrolet C/K30 Chassis-Cab models equipped with dual rear wheels (RPO R05). Firestone has reported that due to a possible manufacturing problem, the wheel may crack in the drop center portion of the rim. If a crack were to occur on a wheel with a tube type tire mounted to it and remain undetected, the crack could spread and eventually split the wheel resulting in rapid air pressure loss from the tire. Rapid loss of air pressure in a tire, when the vehicle is in motion, may cause loss of vehicle control and subsequent vehicle crash without prior warning. Number :

85C02

Section : 3E

DEFECT INVOLVED (CONT'D)

Dealers are to inspect all wheels and replace any that have suspect manufacturing date codes.

VEHICLES INVOLVED

Involved are certain 1984-1985 Chevrolet C/K30 Chassis-Cab Models equipped with dual rear wheels (RPO 105) and built within the following vehicle identification number breakpoints:

Plant Year From Thru

Pontiac 1984 EV142604 EV144075

Pontiac 1985 FV100001 FV100211

Involved vehicles have been identified by Vehicle Identification Number Computer Listings. Computer listings contain the complete Vehicle Identification Number, owner name and address data, and are furnished to the involved dealers with the campaign bulletin. Owner name and address data furnished will enable dealers to follow-up with owners involved in this campaign.

These listings may contain owner names and addresses obtained from State Motor Vehicle Registration Records. The use of such motor vehicle registration data for any other purpose is a violation of law in several states. Accordingly, you are urged to limit the use of this listing to the follow-up necessary to complete this campaign. Any dealer not receiving a computer listing with the campaign bulletin was not shipped any involved vehicles.

OWNER NOTIFICATION

Owners will be notified of this campaign on their vehicles by Chevrolet Motor Division (see copy of Owner Letter included with this bulletin).

DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time

forward.

Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future, you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle.

Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin. Number :

85C02

Section : 3E

SERVICE PROCEDURE

WHEEL INSPECTION

1. Raise vehicle.

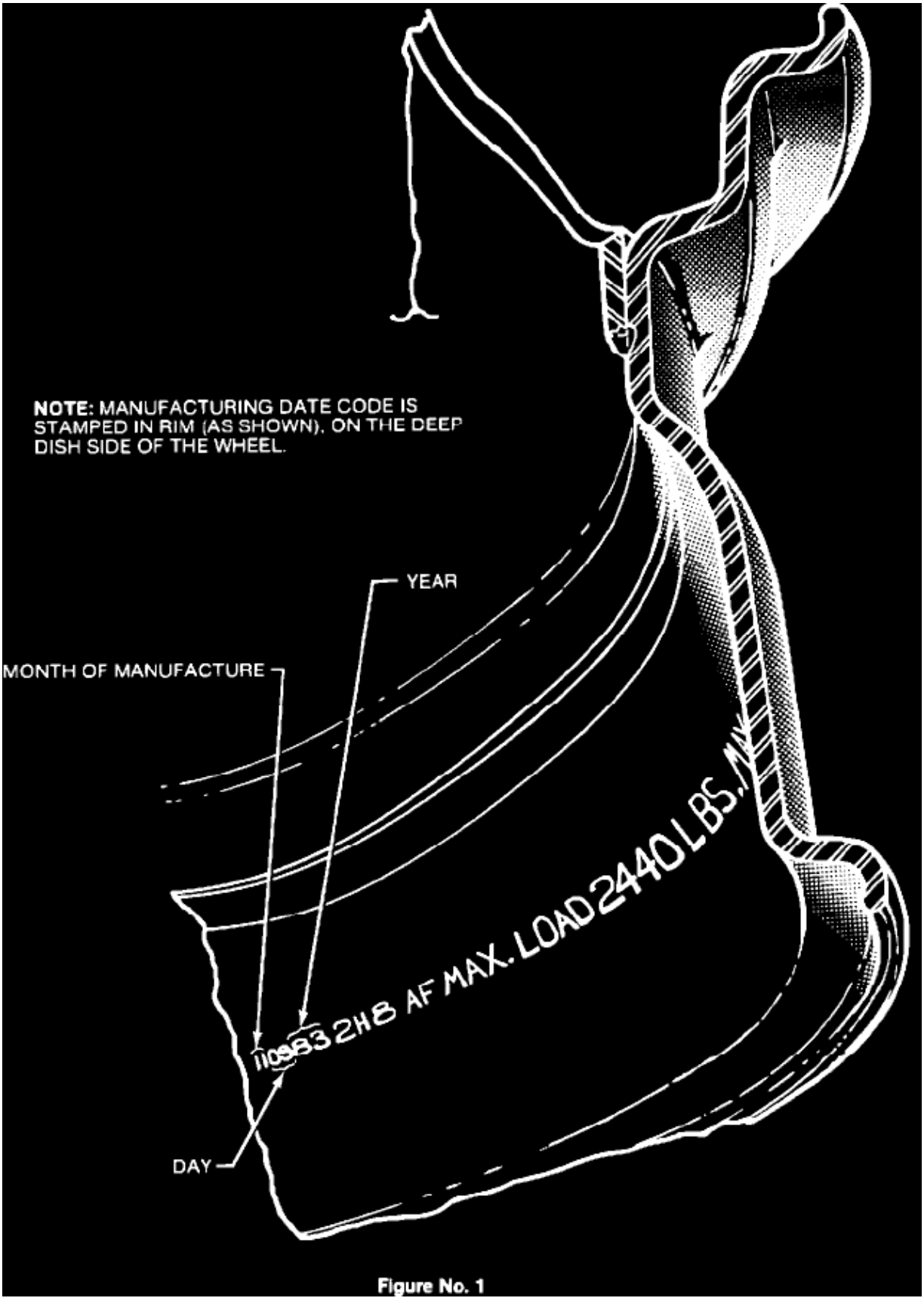


Figure No. 1

-Wheel Inspection

2. Inspect all wheels, including spare if equipped, for Manufacturing Date Code (see Figure 1).

It will be necessary to remove the rear dual wheels to inspect the inner wheel on each side.

3. If a wheel has one of the following suspect Manufacturing Date Codes or if the date code cannot be read, replace the wheel using the procedure below:

Month Day Year

7 19 84

7 20 84

7 21 84

7 22 84

7 23 84

7 24 84

7 25 84

7 26 84

4. If none of the wheels have above suspect Manufacturing Date Codes, no further action is required. Reinstall wheels as described in the 1984 Chevrolet Light Duty Truck Service Manual ST-330-84, 3E-9.

WHEEL REPLACEMENT

1. Obtain replacement wheel, P/N 14035381, and (for vehicles equipped with tubeless tires) new valve stem, P/N 274288.

2. Mask inboard and outboard sides of flat portion of wheel center section (wheel mounting surfaces) and paint with the appropriate color to match the wheel removed.

Paint is not required on the tire mounting side of rim.

3. If vehicle is equipped with tubeless tires, install new valve stem in replacement wheel.

4. Remove tire from wheel to be replaced.

5. Mount tube, if required, and tire on replacement wheel and balance the assembly (reference the 1984/1985 Light Duty Truck Service Manual ST-382-85 3E-9 for instructions).

6. Lower vehicle and install Campaign Completion label.

Number : 85C02

Section : 3E

Page No.: 5

PARTS INFORMATION

Parts required to complete this modification are to be obtained from the Warehousing and Distribution Division of General Motors (WDDGM). To ensure that these parts will be obtained as soon as possible, they should be ordered from WDDGM on a C.I.O. order with no special instruction code, but order on an advise code (2).

Part Number Quantity Description

14035381 As required 16 X 6 Disc Wheel

274288 As required Valve stem

IMPORTANT: Defective wheel(s) removed from the involved vehicles will be retained by the dealer in accordance with the instructions outlined in the dealers current Policy and Procedures Manual.

CLAIM INFORMATION

Submit a Product Campaign Claim with the information indicated below:

Parts Failed Parts Failure Labor Labor *Other

Count Part No. Allowance Code Operation Hours Hours

00 V2400 .6 .1

DESCRIPTION: Inspect all wheels, including spare when so equipped for date code only. Includes R & R rear dual wheels. No further action required.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14035381 00 V2401 1.6 .1 4.34

DESCRIPTION: Inspect all wheels, replace one (1) wheel only.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

4 14035381 00 V2402 2.3 .1 6.98

DESCRIPTION: Inspect all wheels and replace two (2) wheels. Number :

85C02

Section : 3E

Page No.: 6

CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor ***Labor Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

6 14035381 00 V2403 3.0 .1 9.62

DESCRIPTION: Inspect all wheels and replace three (3) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

8 14035381 00 V2404 3.6 .1 12.26

DESCRIPTION: Inspect all wheels and replace four (4) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

10 14035381 00 V2405 4.3 .1 14.90

DESCRIPTION: Inspect all wheels and replace five (5) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

12 14035381 00 V2406 5.0 .1 17.54

DESCRIPTION: Inspect all wheels and replace six (6) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

12 14035381 00 V2407 5.7 .1 18.30

DESCRIPTION: Inspect all wheels and replace seven (7) wheels.

Number: 85C02

Section: 3E Page No.: 7

CLAIM INFORMATION (CONT'D)

*Campaign Administrative Allowance.

**The Parts Allowance should be the sum total of the current WDDGM Dealer Net price plus 30% for wheel assemblies.

***Labor Hours includes labor time for painting, paint "mix time", tire mounting, balancing, and R & R of wheel assembly from vehicle.

The Net Amount credit will automatically be given for each labor operation to cover the cost of paint, paint supplies and valve stem(s) used in conjunction with the repair.

Dealers will automatically receive the correct labor and material allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

CAMPAIGN IDENTIFICATION LABEL

Campaign Identification Label

Each vehicle modified in accordance with the instructions outlined in this Product Campaign Bulletin will require a "Campaign Identification Label." Each label provides a space to include the five digit dealer code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen. Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner.

Apply "Campaign Identification Label" only on a clean dry surface. Number :

85C02

Section : 3E

Page No.: 8

ADMINISTRATIVE PROCEDURES

REFER TO THE CURRENT CHEVROLET SERVICE POLICIES AND PROCEDURES MANUAL AND CLAIMS PROCESSING MANUAL FOR CAMPAIGN HANDLING AND ADMINISTRATIVE PROCEDURES. Dear Chevrolet Owner:

This notice is sent to you in accordance with the requirements of the National Traffic and Motor Vehicle Safety Act.

General Motors has been notified by Firestone Steel Products that a defect which relates to motor vehicle safety exists in some Firestone Steel Products 16 X 6 disc wheels, which were installed on some 1984-1985 Chevrolet C/K30 Chassis-Cab models equipped with dual rear wheels (RPO R05). Firestone has reported that due to a possible manufacturing problem, the wheel may crack in the drop center portion of the rim. If a crack were to occur on a wheel with a tube type tire mounted to it and remain undetected, the crack could spread and eventually split the wheel resulting in rapid air pressure loss from the tire. Rapid loss of air pressure in a tire, when the vehicle is in motion, may cause loss of vehicle control and subsequent vehicle crash without prior warning.

To prevent the possibility of the condition occurring on your vehicle, please contact your Chevrolet Dealer on or after the date shown below to arrange a service date. Your dealer will inspect each wheel on your vehicle and replace it if necessary. This service will be completed at no charge to you.

Instructions for making this correction have been sent to your Chevrolet Dealer. It is estimated that parts will be available on November 13, 1984. The labor time necessary to inspect the wheels on

your vehicle is approximately 30 minutes. Additional labor time to replace your vehicles wheels if necessary, will vary between 1 and 1/2 hours and 6 hours. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

Your Chevrolet Dealer is best equipped to obtain parts and provide service to ensure your vehicle is corrected as promptly as possible. However, if you take your vehicle to your dealer on the agreed service date, and they do not remedy this condition on that date or within five days, we recommend you contact the nearest Chevrolet Zone Office, either in person or by telephone. The Zone Office will assist you and the dealer in getting your vehicle corrected. The locations and the telephone numbers of the zone offices are listed in your Owner's Manual.

After contacting your dealer and the zone office, if you are still not satisfied that we have done our best to remedy this condition without charge within a reasonable time, you may wish to write the Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590, or call 800-424-9393 (Washington D.C. residents use 426-0123). The enclosed owner reply card identifies your vehicle. Presentation of this card to your dealer will assist in making the correction in the shortest possible time. If you have sold or traded your vehicle, please let us know by completing the postage paid owner reply card and returning it to us.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your safety and continued satisfaction with our products.

Chevrolet Motor Division General Motors Corporation

Enclosure

Wheels: All Technical Service Bulletins Wheels - Chrome Wheel Staining/Pitting/Corrosion

INFORMATION

Bulletin No.: 00-03-10-002F

Date: April 21, 2011

Subject: Chemical Staining, Pitting, Corrosion and/or Spotted Appearance of Chromed Aluminum Wheels

Models:

2012 and Prior GM Cars and Trucks

Supercede: This bulletin is being revised to update model years, suggest additional restorative products and add additional corrosion information. Please discard Corporate Bulletin Number 00-03-10-002E (Section 03 - Suspension). Important You may give a copy of this bulletin to the customer.

What is Chemical Staining of Chrome Wheels? Figure 1

Chemical staining in most cases results from acid based cleaners (refer to Figure 1 for an example). These stains are frequently milky, black, or greenish in appearance. They result from using cleaning solutions that contain acids on chrome wheels. Soap and water is usually sufficient to clean wheels.

If the customer insists on using a wheel cleaner they should only use one that specifically states that it is safe for chromed wheels and does not contain anything in the following list. (Dealers should also survey any products they use during prep or normal cleaning of stock units for these chemicals.)

- Ammonium Bifluoride (fluoride source for dissolution of chrome)

- Hydrofluoric Acid (directly dissolves chrome)

- Hydrochloric Acid (directly dissolves chrome)

- Sodium Dodecylbenzenesulfonic Acid

- Sulfamic Acid

- Phosphoric Acid

- Hydroxyacetic Acid

Notice

Many wheel cleaner instructions advise to take care to avoid contact with painted surfaces. Most customers think of painted surfaces as the fenders, quarter panels and other exterior sheet metal. Many vehicles have painted brake calipers. Acidic wheel cleaners may craze, crack, or discolor the paint on the brake calipers. Damage from wheel cleaners is not covered under the vehicle new car warranty. Soap and water applied with a soft brush is usually all that is required to clean the calipers.

Whenever any wheel cleaner is used, it must be THOROUGHLY rinsed off of the wheel with clean, clear water. Special care must be taken to rinse under the hub cap, balance weights, wheel nuts, lug nut caps, between the wheel cladding and off the back side of the wheel. Wheels returned to the Warranty Parts Center (WPC) that exhibit damage from wheel cleaners most often have the damage around and under the wheel weight where the cleaner was incompletely flushed away.

Notice

Do not use cleaning solutions that contain hydrofluoric, oxalic and most other acids on chrome wheels (or any wheels).

If the customer is unsure of the chemical make-up of a particular wheel cleaner, it should be avoided.

For wheels showing signs of milky staining from acidic cleaners, refer to Customer Assistance and Instructions below.

Warranty of Stained Chrome Wheels

Stained wheels are not warrantable. Most acid based cleaners will permanently stain chrome wheels. Follow-up with dealers has confirmed that such cleaners were used on wheels that were returned to the Warranty Parts Center (WPC). Any stained wheels received by the WPC will be charged back to the dealership. To assist the customer, refer to Customer Assistance and Instructions below.

Pitting or Spotted Appearance of Chrome Wheels Figure 2

A second type or staining or finish disturbance may result from road chemicals, such as calcium chloride used for dust control of unpaved roads. The staining will look like small pitting (refer to Figure 2). This staining will usually be on the leading edges of each wheel spoke, but may be uniformly distributed. If a vehicle must be operated under such conditions, the chrome wheels should be washed with mild soap and water and thoroughly rinsed as soon as conveniently possible.

Important Road chemicals, such as calcium chloride used for dust control of unpaved roads, can also stain chrome wheels. The staining will look like small pitting. This staining will usually be on the leading edges of each wheel spoke. This is explained by the vehicle traveling in the forward direction while being splashed by the road chemical. If a vehicle must be operated under such conditions, the chrome wheels should be washed with mild soap and water and thoroughly rinsed as soon as conveniently possible.

Warranty of Pitted or Spotted Chrome Wheels

Wheels returned with pitting or spotting as a result of road chemicals may be replaced one time. Damage resulting from contact with these applied road chemicals is corrosive to the wheels finish and may cause damage if the wheels are not kept clean.

Important Notify the customer that this is a one time replacement. Please stress to the customer the vital importance of keeping the wheels clean if they are operating the vehicle in an area that applies calcium chloride or other dust controlling chemicals! "GM of Canada" dealers require prior approval by the District Manager - Customer Care and Service Process (DM-CCSP).

"Stardust" Corrosion of Chrome Wheels Figure 3

A third type of finish disturbance results from prolonged exposure to brake dust and resultant penetration of brake dust through the chrome. As brakes are applied hot particles of brake material are thrown off and tend to be forced through the leading edge of the wheel spoke windows by airflow. These

hot particles embed themselves in the chrome layer and create a small pit. If the material is allowed to sit on the wheel while it is exposed to moisture or salt, it will corrode the wheel beneath the

chrome leaving a pit or small blister in the chrome.

Heavy brake dust build-up should be removed from wheels by using GM Chrome Cleaner and Polish, P/N 1050173 (in Canada use 10953013). For moderate cleaning, light brake dust build-up or water spots use GM Swirl Remover Polish, P/N 12377965 (in Canada, use Meguiars Plast-X(TM) Clear Plastic Cleaner and Polish #G12310C**). After cleaning, the wheel should be waxed using GM Cleaner Wax, P/N 12377966 (in Canada, use Meguiars Cleaner Wax #M0616C**), which will help protect the wheel from brake dust and reduce adhesion of any brake dust that gets on the wheel surface. For general maintenance cleaning, PEEK Metal Polish† may be used. It will clean and shine the chrome and leave behind a wax coating that may help protect the finish.

Warranty of Stardust Corroded Chrome Wheels

Wheels returned with pitting or spotting as a result of neglect and brake dust build-up may be replaced one time.

Important Notify the customer that this is a one time replacement. Please stress to the customer the vital importance of keeping the wheels clean and free of prolonged exposure to brake dust build-up. "GM of Canada" dealers require prior approval by the District Manager - Customer Care and Service Process (DM-CCSP).

Customer Assistance and Instructions

GM has looked for ways customers may improve the appearance of wheels damaged by acidic cleaners. The following product and procedure has been found to dramatically improve the appearance of stained wheels. For wheels that have milky stains caused by acidic cleaners try the following:

Notice

THE 3M CHROME AND METAL POLISH REQUIRED FOR THIS PROCEDURE IS AN EXTREMELY AGGRESSIVE POLISH/CLEANER. THE WHEELS MUST BE CLEANED BEFORE APPLICATION TO AVOID SCRATCHING THE WHEEL SURFACE. THIS PRODUCT WILL REDUCE THE THICKNESS OF THE CHROME PLATING ON THE WHEEL AND IF USED INCORRECTLY OR EXCESSIVELY MAY REMOVE THE CHROME PLATING ALL TOGETHER, EXPOSING A LESS BRIGHT AND BRASSY COLORED SUB-LAYER. FOLLOW INSTRUCTIONS EXACTLY.

1. Wash the wheels with vigorously with soap and water. This step will clean and may reduce wheel staining. Flood all areas of the wheel with water

to rinse.

2. Dry the wheels completely.

Notice Begin with a small section of the wheel and with light pressure buff off polish and examine results. ONLY apply and rub with sufficient force and time to remove enough staining that you are satisfied with the results. Some wheels may be stained to the extent that you may only achieve a 50% improvement while others may be able to be restored to the original lustre. IN ALL CASES, only apply until the results are satisfactory.

3. Apply 3M Chrome and Metal Polish #39527* with a clean terry cloth towel. As you apply the polish, the staining will be diminished. 4. When dry, buff off the polish with a clean portion of the towel. 5. Repeat application of the 3M Chrome and Metal Polish until satisfied with the results. If continued applications fail to improve the appearance

further discontinue use.

This procedure will improve the appearance of the wheels and may, with repeated applications, restore the finish dramatically. For wheels that exhibit spotting from road chemicals the above procedure may marginally improve the condition but will not restore the finish or remove the pitting. In this type of staining the wheel finish has actually been removed in spots and no manner of cleaning will restore the finish.

†*We believe this source and their products to be reliable. There may be additional manufacturers of such products/materials. General Motors does not endorse, indicate any preference for or assume any responsibility for the products or material from this firm or for any such items that may be available from other sources.

Parts Information

Part Number	Description
12377965 G12310C (Canada)	GM Swirl Remover Polish Meguiars Plast-X Clear Plastic Cleaner & Polish
12377966 M0616C (Canada)	GM Cleaner Wax Meguiars Cleaner Wax**
1050173 (in Canada use 10953013)	GM Chrome Cleaner and Polish
39527	3M Chrome and Metal Polish* (10 oz)
33002	PEEK Polish† 100 ml Tube (www.tripeek.com)

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*This product is currently available from 3M. To obtain information for your local retail location please call 3M at 1-888-364-3577.

**This product is currently available from Meguiars (Canada). To obtain information for your local retail location please call Meguiars at 1-800-347-5700 or at www.meguiarscanada.com.

^ This product is currently available from Tri-Peek International. To obtain information for your local retail location please call Tri-Peek at

1-877-615-4272 or at www.tripeek.com.

Disclaimer

INFORMATION

Bulletin No.: 99-08-51-007E

Date: March 17, 2011

Subject: Refinishing Aluminum Wheels

Models:

2012 and Prior GM Passenger Cars and Trucks

Supercede: This bulletin is being revised to add additional model years. Please discard Corporate Bulletin Number 99-08-51-007D (Section 08 - Body and Accessories).

This bulletin updates General Motor's position on refinishing aluminum wheels. GM does not endorse any repairs that involve welding, bending, straightening or re-machining. Only cosmetic refinishing of the wheel's coatings, using recommended procedures, is allowed.

Evaluating Damage

In evaluating damage, it is the GM Dealer's responsibility to inspect the wheel for corrosion, scrapes, gouges, etc. The Dealer must insure that such damage is not deeper than what can be sanded or polished off. The wheel must be inspected for cracks. If cracks are found, discard the wheel. Any wheels with bent rim flanges must not be repaired or refinished. Wheels that have been refinished by an outside company must be returned to the same vehicle. The Dealer must record the wheel ID stamp or the cast date on the wheel in order to assure this requirement. Refer to Refinisher's Responsibility - Outside Company later in this bulletin.

Aluminum Wheel Refinishing Recommendations

- Chrome-plated aluminum wheels Re-plating these wheels is not recommended.

- Polished aluminum wheels These wheels have a polyester or acrylic clearcoat on them. If the clearcoat is damaged, refinishing is possible. However, the required refinishing process cannot be performed in the dealer environment. Refer to Refinisher's Responsibility - Outside Company later in this bulletin.

- Painted aluminum wheels These wheels are painted using a primer, color coat, and clearcoat procedure. If the paint is damaged, refinishing is possible. As with polished wheels, all original coatings must be removed first. Media blasting is recommended. Refer to GM Aluminum Refinishing Bulletin #53-17-03A for the re-painting of this type of wheel.

- Bright, machined aluminum wheels These wheels have a polyester or acrylic clearcoat on them. In some cases, the recessed "pocket" areas of the wheel may be painted. Surface refinishing is possible. The wheel must be totally stripped by media blasting or other suitable means. The wheel should be resurfaced by using a sanding process rather than a machining process. This allows the least amount of material to be removed.

Important Do not use any re-machining process that removes aluminum. This could affect the dimensions and function of the wheel.

Painting is an option to re-clearcoating polished and bright machined aluminum wheels. Paint will better mask any surface imperfections and is somewhat more durable than clearcoat alone. GM recommends using Corsican SILVER WAEQ9283 for a fine "aluminum-like" look or Sparkle SILVER WA9967 for a very bright look. As an option, the body color may also be used. When using any of the painting options, it is recommended that all four wheels be refinished in order to maintain color uniformity. Refer to GM Aluminum Refinishing Bulletin #53-17-03A for specific procedures and product recommendations.

Refinisher's Responsibility - Outside Company

Important Some outside companies are offering wheel refinishing services. Such refinished wheels will be permanently marked by the refinisher and are warranted by the refinisher. Any process that re-machines or otherwise re-manufactures the wheel should not be used.

A refinisher's responsibility includes inspecting for cracks using the Zyglo system or the equivalent. Any cracked wheels must not be refinished. No welding, hammering or reforming of any kind is allowed. The wheel ID must be recorded and follow the wheel throughout the process in order to assure that the same wheel is returned. A plastic media blast may be used for clean up of the wheel. Hand and/or lathe sanding of the machined surface and the wheel window is allowed. Material removal, though, must be kept to a minimum. Re-machining of the wheel is not allowed. Paint and/or clear coat must not be present on the following surfaces: the nut chamfers, the wheel mounting surfaces and the wheel pilot hole. The refinisher must permanently ID stamp the wheel and warrant the painted/clearcoated surfaces for a minimum of one year or the remainder of the new vehicle warranty, whichever is

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longer.

Important Whenever a wheel is refinished, the mounting surface and the wheel nut contact surfaces must not be painted or clearcoated. Coating these surfaces could affect the wheel nut torque.

When re-mounting a tire on an aluminum wheel, coated balance weights must be used in order to reduce the chance of future cosmetic damage.

Disclaimer

INFORMATION

Bulletin No.: 06-03-10-010A

Date: June 09, 2010

Subject: Information on Proper Wheel Changing Procedures and Cautions

Models:

2011 and Prior GM Passenger Cars and Trucks 2010 and Prior HUMMER Models 2005-2009 Saab 9-7X 2005-2009 Saturn Vehicles

Attention:

Complete wheel changing instructions for each vehicle line can be found under Tire and Wheel Removal and Installation in Service Information (SI). This bulletin is intended to quickly review and reinforce simple but vital procedures to reduce the possibility of achieving low torque during wheel installation. Always refer to SI for wheel lug nut torque specifications and complete jacking instructions for safe wheel changing.

Supercede: This bulletin is being revised to include the 2011 model year and update the available special tool list. Please discard Corporate Bulletin Number 06-03-10-010 (Section 03 - Suspension).

Frequency of Wheel Changes - Marketplace Driven

Just a few years ago, the increasing longevity of tires along with greater resistance to punctures had greatly reduced the number of times wheels were removed to basically required tire rotation intervals. Today with the booming business in accessory wheels/special application tires (such as winter tires), consumers are having tire/wheel assemblies removed - replaced - or installed more than ever. With this increased activity, it opens up more of a chance for error on the part of the technician. This bulletin will review a few of the common concerns and mistakes to make yourself aware of.

Proper Servicing Starts With the Right Tools

The following tools have been made available to assist in proper wheel and tire removal and installation.

- J 41013 Rotor Resurfacing Kit (or equivalent)

- J 42450-A Wheel Hub Resurfacing Kit (or equivalent)

Corroded Surfaces

One area of concern is corrosion on the mating surfaces of the wheel to the hub on the vehicle. Excessive corrosion, dirt, rust or debris built up on these surfaces can mimic a properly tightened wheel in the service stall. Once the vehicle is driven, the debris may loosen, grind up or be washed away from water splash. This action may result in clearance at the mating surface of the wheel and an under-torqued condition.

Caution

Before installing a wheel, remove any buildup on the wheel mounting surface and brake drum or brake disc mounting surface. Installing wheels with poor metal-to-metal contact at the mounting surfaces can cause wheel nuts to loosen. This may cause a wheel to come off when the vehicle is moving, possibly resulting in a loss of control or personal injury.

Whenever you remove the tire/wheel assemblies, you must inspect the mating surfaces. If corrosion is found, you should remove the debris with a die grinder equipped with a fine sanding pad, wire brush or cleaning disc. Just remove enough material to assure a clean, smooth mating surface.

The J 41013 (or equivalent) can be used to clean the following surfaces:

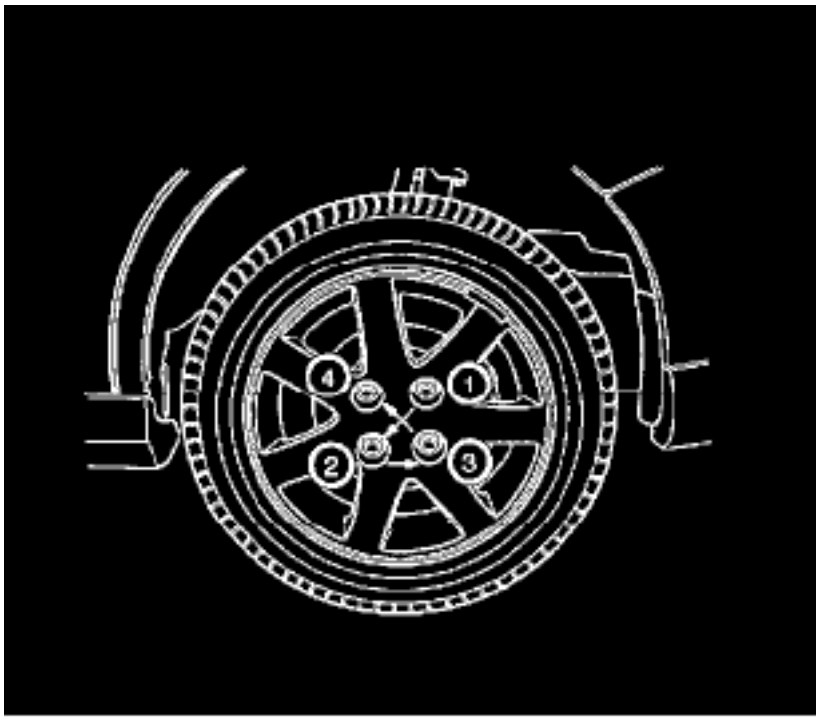
- The hub mounting surface

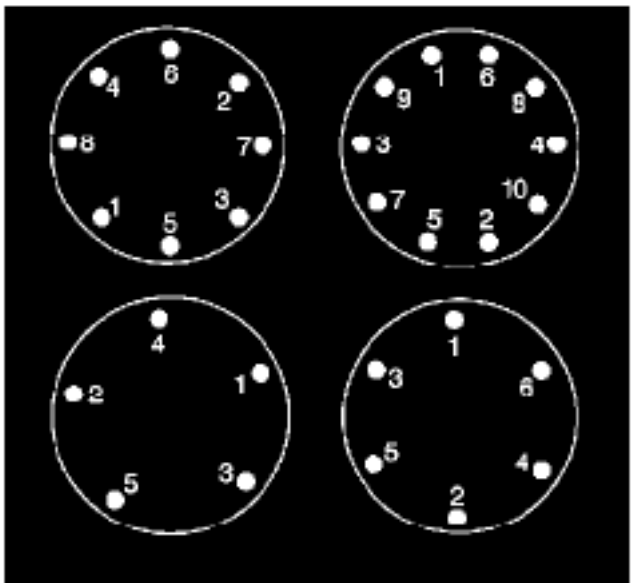
- The brake rotor mounting surface

- The wheel mounting surface

Use the J 42450-A (or equivalent) to clean around the base of the studs and the hub.

Lubricants, Grease and Fluids





Some customers may use penetrating oils, grease or other lubricants on wheel studs to aid in removal or installation. Always use a suitable cleaner/solvent to remove these lubricants prior to installing the wheel and tire assemblies. Lubricants left on the wheel studs may cause improper readings of wheel nut torque. Always install wheels to clean, dry wheel studs ONLY.

Notice

Lubricants left on the wheel studs or vertical mounting surfaces between the wheel and the rotor or drum may cause the wheel to work itself loose after the vehicle is driven. Always install wheels to

clean, dry wheel studs and surfaces ONLY. Beginning with 2011 model year vehicles, put a light coating of grease, GM P/N 1051344 (in Canada, P/N 9930370), on the inner surface of the wheel pilot hole to prevent wheel seizure to the axle or bearing hub.

Wheel Stud and Lug Nut Damage

Always inspect the wheel studs and lug nuts for signs of damage from crossthreading or abuse. You should never have to force wheel nuts down the stud. Lug nuts that are damaged may not retain properly, yet give the impression of fully tightening. Always inspect and replace any component suspected of damage.

Tip

Always start wheel nuts by hand! Be certain that all wheel nut threads have been engaged BEFORE tightening the nut.

Important If the vehicle has directional tread tires, verify the directional arrow on the outboard side of the tire is pointing in the direction of forward rotation.

Wheel Nut Tightening and Torque

Improper wheel nut tightening can lead to brake pulsation and rotor damage. In order to avoid additional brake repairs, evenly tighten the wheel nuts to the proper torque specification as shown for each vehicle in SI. Always observe the proper wheel nut tightening sequence as shown below in order to avoid trapping the wheel on the wheel stud threads or clamping the wheel slightly off center resulting in vibration.

The Most Important Service You Provide

While the above information is well known, and wheel removal so common, technicians run the risk of becoming complacent on this very important

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service operation. A simple distraction or time constraint that rushes the job may result in personal injury if the greatest of care is not exercised. Make it a habit to double check your work and to always side with caution when installing wheels.

Disclaimer

Part Number	Description
12377966 (in Canada, 10952905)	GM Vehicle Care Cleaner Wax 16 fl oz (.473 L)

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Wheels: All Technical Service Bulletins Wheels - Chrome Wheel Brake Dust Accumulation/Pitting

Bulletin No.: 04-03-10-012B

Date: February 01, 2008

INFORMATION

Subject: Pitting and Brake Dust on Chrome wheels

Models: 2008 and Prior GM Passenger Cars and Trucks (including Saturn) 2008 and Prior HUMMER H2, H3 2005-2008 Saab 9-7X

Supercede:

This bulletin is being revised to add model years. Please discard Corporate Bulletin Number 04-03-10-012A (Section 03 - Suspension).

Analysis of Returned Wheels

Chrome wheels returned under the New Vehicle Limited Warranty for pitting concerns have recently been evaluated. This condition is usually most severe in the vent (or window) area of the front wheels. This "pitting" may actually be brake dust that has been allowed to accumulate on the wheel. The longer this accumulation builds up, the more difficult it is to remove.

Cleaning the Wheels

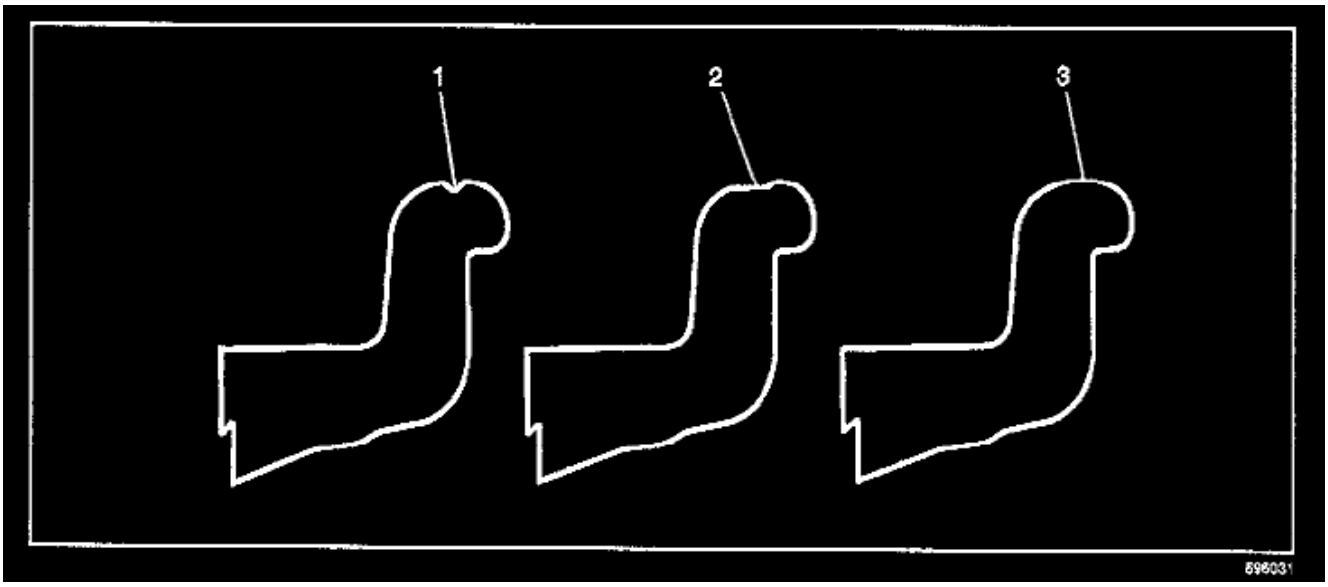
In all cases, the returned wheels could be cleaned to their original condition using GM Vehicle Care Cleaner Wax, P/N 12377966 (in Canada, P/N 10952905). When using this product, you should confine your treatment to the areas of the wheel that show evidence of the brake dust build-up. This product is only for use on chromed steel or chromed aluminum wheels.

Parts Information

Warranty Information

Wheel replacement for this condition is NOT applicable under the terms of the New Vehicle Limited Warranty.

Disclaimer



Wheels: All Technical Service Bulletins Warranty - OE Chrome Plated Aluminum Wheel ID

File In Section: 03 - Suspension

Bulletin No.: 99-03-10-102

Date: June, 1999

INFORMATION

Subject: Original Equipment Chrome Plated Aluminum Wheel Identification

Models: 1999 and Prior Passenger Cars and Light Duty Trucks

Chrome plated aluminum wheels have been returned to the Warranty Parts Center that are not the original equipment (OE) components.

Original equipment chrome plated aluminum wheels can be identified by either a balance weight clip retention groove (1) or a step (2) that is machined around both of the wheel's rim flanges. The rim flanges (3) of painted original equipment aluminum wheels do not have a groove or a step.

Chrome plated aluminum wheels that do not have the wheel rim flange groove or step are aftermarket chrome plated components and are NOT warrantable. Any aftermarket chrome wheels received by the Warranty Parts Center will be charged back to the dealership.

Wheels: All Technical Service Bulletins Wheels - Sealing Leaking Cast Aluminum

Bulletin Number: 93-3-16 Reference Number: 393504 Publish Date: 7/93

Subject: LEAKING CAST ALUMINUM WHEELS (REPAIR WITH ADHESIVE SEALANT)

Models Affected: 1985-1993 ALL MODELS

Should a vehicle equipped with cast aluminum wheels exhibit a slow leak due to a porous condition existing in the wheel, the wheel can be repaired by using Dow Corning Silastic 732 RTV, p/n 1052366 or equivalent, as described in the following procedure:

1. Remove tire-wheel assembly from vehicle.

2. Locate leaking area by inflating tire to 40 psi and dipping tire-wheel assembly in water bath.

3. If air bubbles are observed, mark leak area and remove tire from wheel.

4. Scuff INSIDE rim surface at leak area with # 80 grit paper and clean area with general purpose cleaner, such as 3M # 08984.

5. Apply 1/8" thick layer of adhesive/sealant to leak area on INSIDE of rim and allow six hours of drying time.

6. Mount tire on wheel, pressurizing to 40 psi and check for leaks.

NOTICE:

Caution must be used when mounting the tire so as not to damage the sealer.

7. Adjust tire pressure to meet placard specification.

8. Balance tire-wheel assembly, using proper coated weights.

9. Water test wheel again.

10. Reinstall tire-wheel assembly on vehicle.

Parts are currently available from GMSPO.

WARRANTY INFORMATION:

Labor Operation Number: E0420

BALANCE WEIGHT USAGE FOR LIGHT TRUCK ALUMINUM WHEELS

	AW series (coated)	MC series (coated)
1988 - 1991 C/K truck	X	
1992 - 1993 C/K truck		X
1985 - 1991 R/V truck	X	
1985 - 1992 M/L van	X	
1993 M/L van		X
1985 - 1993 G van	X	
1985 - 1993 S/T truck	X	

TYPE "AW"

TYPE "MC"

Wheels: All Technical Service Bulletins Wheels - Finish Damage During Off Car Balancing

BULLETIN NUMBER: 93-3E-67 SECTION: 3E Wheels & Tires

NUMBER: 3

CORPORATE REFERENCE NUMBER: 3935O2R

DATE: June 1993

SUBJECT: INFORMATION ON COSMETIC DAMAGE TO ALUMINUM WHEELS DURING BALANCING

MODELS: 1985-93 MODELS WITH ALUMINUM WHEELS

Some aluminum wheels on GM models may incur cosmetic damage during balancing if proper care and procedures are not used. All aluminum wheels have a clearcoat paint on them that must be cared for like any other painted surface.

Some off-car vehicle balancer retaining cups used to clamp the wheel to the balancer may put a circular mark into the clearcoat on the face of the wheel. Like any other clearcoat damage, this may be difficult to remove or repair, depending on severity.

ALWAYS use balancer retainer cups that are protected with rubber, plastic, or other nonmetallic materials where contact is made with the wheel. Make

sure the retainer cup is tree from dirt, grease, and gouges. Most wheel balancers now offer this type of protected retainer.

DO NOT allow the retainer cup to rotate against the wheel's surface when tightening the wheel to the balancer.

DO NOT OVERTIGHTEN. Most balancers use a large "wing nut" design to clamp the retainer against the wheel. Hand tight is sufficient.

This procedure will allow accurate balancing using the conventional back cone method.

Important:

Coated balance weights must be used on aluminum wheels to prevent damage to the rim flange.

Except for the N9O 4X4 wheel used on T trucks, all light truck aluminum wheels will accept either "AW" series or "MO" series clip-on coated weights on both the inside and outside rim flanges. The N9O T truck wheel will accept "AW" series weights on the inside rim flange only. The outside rim flange is not designed to accept a clip-on weight. If such a weight installation is attempted, a poor fit will result, and the weight may fall off and/or cause cosmetic damage to the rim flange. This wheel can be 1) static balanced by clipping all the weight on the inside rim flange (as is done in the assembly plant), or 2) dynamic balanced by clipping a weight on the inside flange and using an adhesive weight near the outside flange.

The charts show "AW" and "MC" balance weight usage. These original equipment coated weights are available at competitive prices through the GM Dealer Equipment program.

Number: 92-232-3E

Section: 3E

Date: JUNE 1992

Corporate Bulletin No.: 233002

ASE No.: A4

Subject: AVOIDING DAMAGE TO STEEL WHEELS FROM IMPROPER WHEEL/TIRE CHANGING TECHNIQUES

Model and Year: 1983-92 ALL PASSENGER CARS AND TRUCKS WITH STEEL WHEELS

It is important to use proper procedures to prevent damage to either the tire mounting surface or the wheel mounting holes. Damage can result from the improper wheel attachment or tire mounting techniques on vehicles with steel wheels.

1. IMPROPER TIRE CHANGING TECHNIQUES:

It takes about 70 seconds for the air to completely exhaust from a large tire. If the technician doesn't wait this amount of time after removing the valve core, the bead breaker on the tire change could put enough force on the tire to bend the wheel at the mounting surface. Such damage can result in vibration, shimmy, and under severe usage (i.e. police vehicle) lead to cracking.

2. OVER TORQUING OF THE WHEEL NUTS:

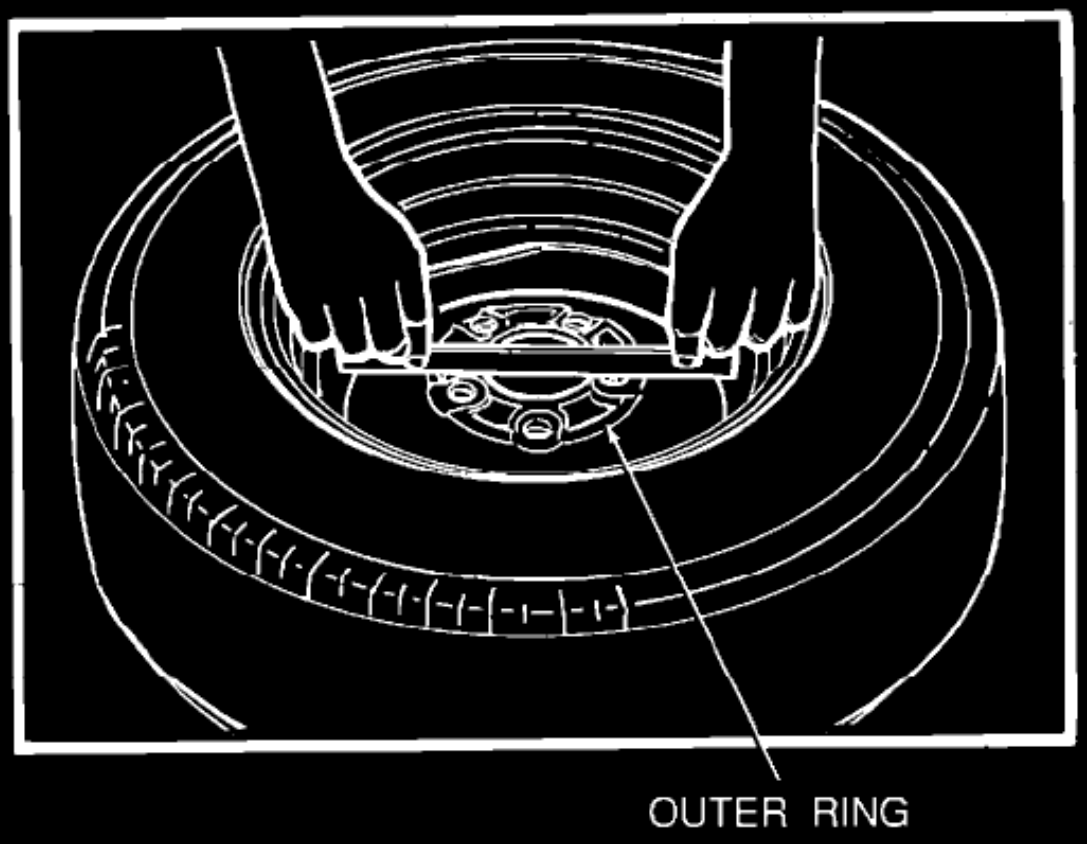
The service specification for wheel nuts is listed in the Service Manuals. Some wheels have been observed with wheel nuts that were over torqued by as much as 50 percent. This may damage the wheel mounting holes and may also lead to cracks.

I. PROPER TIRE CHANGING TECHNIQUES:

Completely deflate the tire before attempting to break the tire bead loose.

MOUNTING SURFACE CHECKING PROCEDURE

STRAIGHT EDGE PROCEDURE

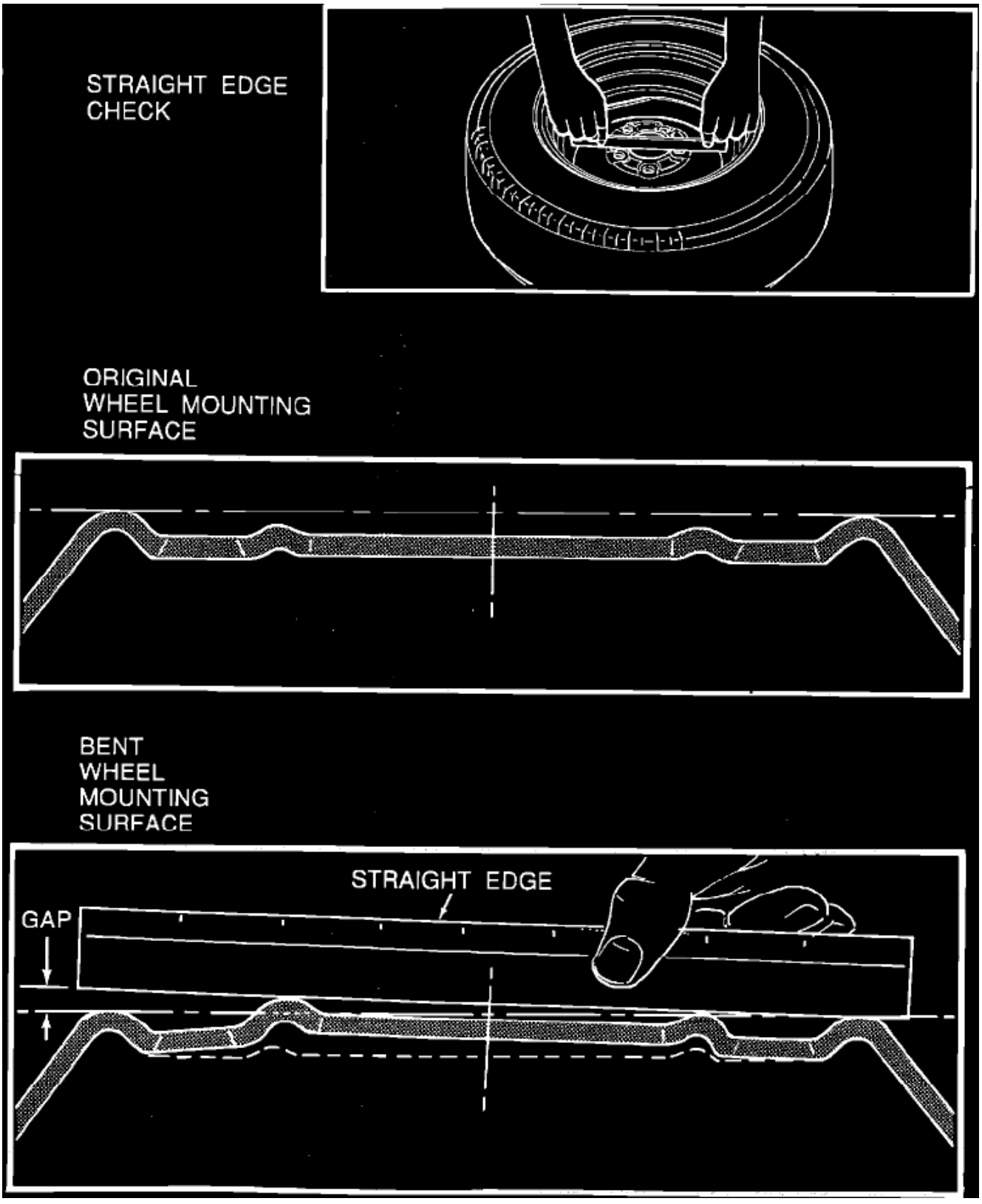


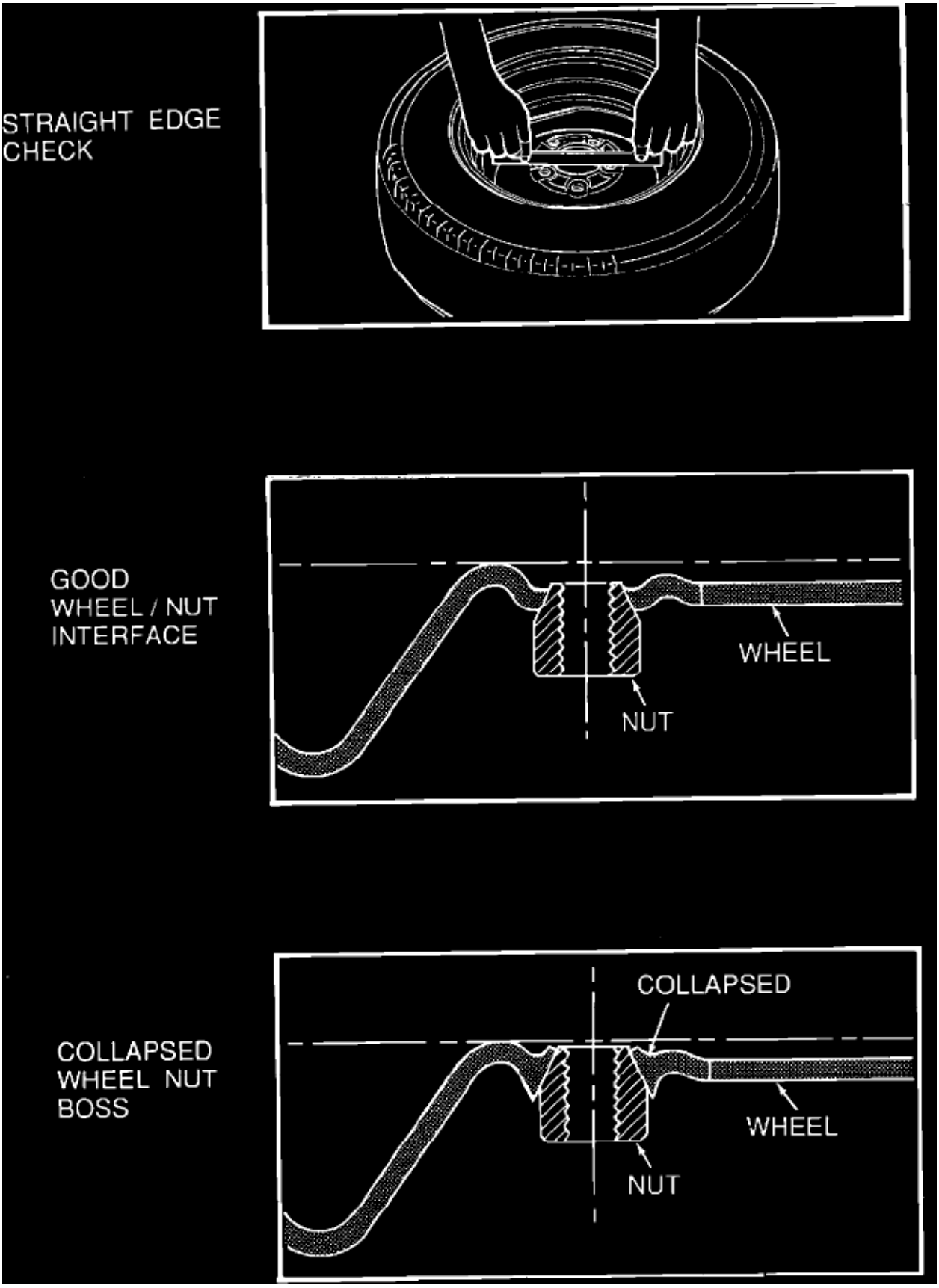
A. Obtain a straight edge approximately 8 - 9 inches long and, while holding it in two hands as shown, place it on the mounting surface of the wheel and try to rock it up and down.

B. Repeat the above procedure on three or four different positions on the wheel mounting surface.

C. The outer ring of the mounting surface is normally raised above everything inside it. If a wheel mounting surface has been bent on a tire changer, it will be raised above the outer ring and the straight edge will rock on this "raised" portion.

D. If a bent wheel is found, it must be replaced.


STRAIGHT EDGE CHECK
ORIGINAL WHEEL MOUNTING SURFACE
BENT WHEEL MOUNTING SURFACE
STRAIGHT EDGE
GAP



A. Obtain a straight edge approximately 8-9 inches long and, while holding it in two hands, as shown in the attached illustration, place it on the inboard mounting surface of the wheel and try to

rock it up and down.

B. Repeat the above procedure on three or four different positions on the wheel inboard mounting surface.

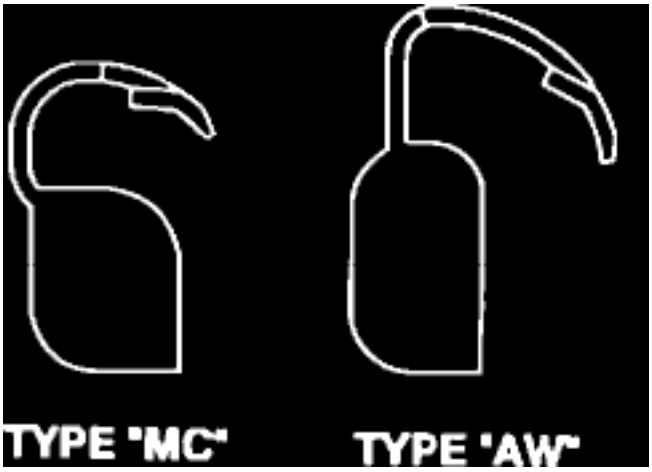
C. The outer ring of the mounting surface is normally raised above everything inside it. If a wheel mounting surface has been bent on a tire changer, it will be raised above the outer ring and the straight edge will rock on this "raised" portion.

D. If a bent wheel is found, it must be replaced.

II. OVER TORQUING OF WHEEL NUTS:

1. A TORQUE WRENCH MUST BE USED to insure that the wheel nuts are tightened to specification. This should be done in two steps using the star pattern. First, snug the nuts down by hand. Then, using the star pattern and a torque wrench, tighten the wheel nuts to about half the final torque. Finally, tighten the wheel nuts to specification using the star pattern and a torque wrench.

2. NEVER use lubricants or penetrating fluids on wheel studs, nuts, or mounting surfaces, as this can raise the actual torque on the nut without a corresponding torque reading on the wrench. Wheel nuts, studs, and mounting surfaces must be clean and dry.



Wheels: All Technical Service Bulletins Aluminum Wheels - New Coated Wheel Weights

Number: 91-35-3E

Section: 3E

Date: August 1990

Corporate Bulletin No.: 003502

Subject: COATED WHEEL WEIGHTS FOR ALUMINUM WHEELS

Model and Year: 1985-91 MODELS WITH CAST ALUMINUM WHEELS

TO: ALL CHEVROLET DEALERS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 89-65-3E, DATED JANUARY 1989. POLYESTER COATED WHEEL WEIGHTS NOW AVAILABLE FROM GMSPO. THE 1990-91 MODEL YEARS HAVE ALSO BEEN ADDED. ALL COPIES OF 89-65-3E SHOULD BE DISCARDED.

Vehicles with cast aluminum wheels use a coated clip on wheel weight. The coating has recently changed from nylon to polyester, giving a more natural appearance that more closely matches the wheel. Coated balance weights are used on both the inboard and outboard rim flanges. They will not discolor, corrode or damage the appearance of the wheel as may have been the case in the past with uncoated clip on weights. These coated weights will fit most GM cast aluminum wheels.

There are two types of coated wheel weights available to fit the GM vehicles (see illustration). Both types of weights are available from GMSPO in 1/4 ounce increments. See usage chart below to determine which type weight is correct for the vehicle.

"MC" Type Weight Used On:

1990-1991 "W" Car

1988-1990 "Y" Car "AW" Type Weight

1989-1991 "L" Car Used On All Other

1991 "B" Car, "U" Van Series Vehicles

1/4 oz. P/N 9591670 P/N 9591669

1/2 oz. 9591584 9591582

3/4 oz. 9591585 9591583

1-1/4 oz. 9591378 9591362

1-1/2 oz. 9591379 9591363

1-3/4 oz. 9591380 9591364

2 oz. 9591381 9591365

"MC" Type Weight Used On:

1990-1991 "W" Car

1988-1990 "Y" Car "AW" Type Weight

1989-1991 "L" Car Used On All Other

1991 "B" Car, "U" Van Series Vehicles

2-1/4 oz. 9591382 9591366

2-1/2 oz. 9591383 9591367

3oz. 9591385 9591369

Parts are currently available from GMSPO.

Dealers should make sure they have a supply of both types weights for balancing GM aluminum wheels.

When installing the coated weights, care must be taken so that the coating does not crack. It is recommended that a Teflon tipped hammer be used, such as 85403 Nicholson Industrial Hammer, their part number CAS 3340551, available through the Charles Strelinger Company, Warren, Mi (313-268-4100), or equivalent.

85-37 3E (X) FEB., 1985 Subject:

LOCKING WHEEL NUTS

Model and Year: ALL

TO: ALL CHEVROLET DEALERS

Whenever a heavier, solid locking wheel nut is used to replace a standard nut, it should be installed nearest the valve stem, and a 1/2 ounce balance weight should be added 180~ opposite the locking nut.

This situation will usually occur on styled wheels. For improved appearance, the balance weight should be installed on the wheel's inboard side.

When rotating tires, always re-install the locking nut nearest the tire valve stem so that it remains opposite the 1/2 ounce balance weight.

This procedure will improve the on-car wheel balance by compensating for the heavy locking wheel nut. This does not apply to the light weight, two-piece locking nuts used on some Chevrolet models.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Maintenance > Wheels and Tires > Wheels > Component Information > Technical Service Bulletins > All Other Service Bulletins for Wheels: > 85C02 > Oct > 84 > Recall - Firestone Steel Wheels Cracking

Wheels: All Technical Service Bulletins Recall - Firestone Steel Wheels Cracking

Number: 85C02

Section: 3E

Date: October, 1984

Subject: PRODUCT SAFETY CAMPAIGN 85C02 FIRESTONE 16 X 6 DISC WHEEL MAY CRACK

Model and Year: 1984-1985 CHEVROLET C/K30 CHASSIS-CAB MODELS EQUIPPED WITH RPO R05 (DUAL REAR WHEELS)

TO: ALL CHEVROLET DEALERS

The National Traffic and Motor Vehicle Safety Act, as amended, provides that each vehicle which is subject to a recall campaign of this type must be adequately repaired within a reasonable time after the owner has tendered it for repair. A failure to adequately repair within 60 days after tender of a vehicle is prima facie evidence of failure to repair within a reasonable time.

If the condition is not adequately repaired within a reasonable time, the owners may be entitled to an identical or reasonably equivalent vehicle at no charge or to a refund of the purchase price less a reasonable allowance for depreciation.

To avoid having to provide these burdensome solutions, every effort must be made to promptly schedule an appointment with each owner and to repair their vehicle as soon as possible. As you will see in reading the attached copy of the letter which is being sent to owners, the owners are being instructed to contact the nearest Chevrolet Zone Office if their dealer does not remedy the condition within five days of the agreed service date. If the condition is not remedied within a reasonable time, they are instructed on how to contact the National Highway Traffic Safety Administration.

DEFECT INVOLVED

General Motors has been notified by Firestone Steel Products that a defect which relates to motor vehicle safety exists in some Firestone Steel Products 16 X 6 disc wheels, which were installed on some 1984- 1985 Chevrolet C/K30 Chassis-Cab models equipped with dual rear wheels (RPO R05). Firestone has reported that due to a possible manufacturing problem, the wheel may crack in the drop center portion of the rim. If a crack were to occur on a wheel with a tube type tire mounted to it and remain undetected, the crack could spread and eventually split the wheel resulting in rapid air pressure loss from the tire. Rapid loss of air pressure in a tire, when the vehicle is in motion, may cause loss of vehicle control and subsequent vehicle crash without prior warning. Number :

85C02

Section : 3E

DEFECT INVOLVED (CONT'D)

Dealers are to inspect all wheels and replace any that have suspect manufacturing date codes.

VEHICLES INVOLVED

Involved are certain 1984-1985 Chevrolet C/K30 Chassis-Cab Models equipped with dual rear wheels (RPO 105) and built within the following vehicle identification number breakpoints:

Plant Year From Thru

Pontiac 1984 EV142604 EV144075

Pontiac 1985 FV100001 FV100211

Involved vehicles have been identified by Vehicle Identification Number Computer Listings. Computer listings contain the complete Vehicle Identification Number, owner name and address data, and are furnished to the involved dealers with the campaign bulletin. Owner name and address data furnished will enable dealers to follow-up with owners involved in this campaign.

These listings may contain owner names and addresses obtained from State Motor Vehicle Registration Records. The use of such motor vehicle registration data for any other purpose is a violation of law in several states. Accordingly, you are urged to limit the use of this listing to the follow-up necessary to complete this campaign. Any dealer not receiving a computer listing with the campaign bulletin was not shipped any involved vehicles.

OWNER NOTIFICATION

Owners will be notified of this campaign on their vehicles by Chevrolet Motor Division (see copy of Owner Letter included with this bulletin).

DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time

forward.

Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future, you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle.

Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin. Number :

85C02

Section : 3E

SERVICE PROCEDURE

WHEEL INSPECTION

1. Raise vehicle.

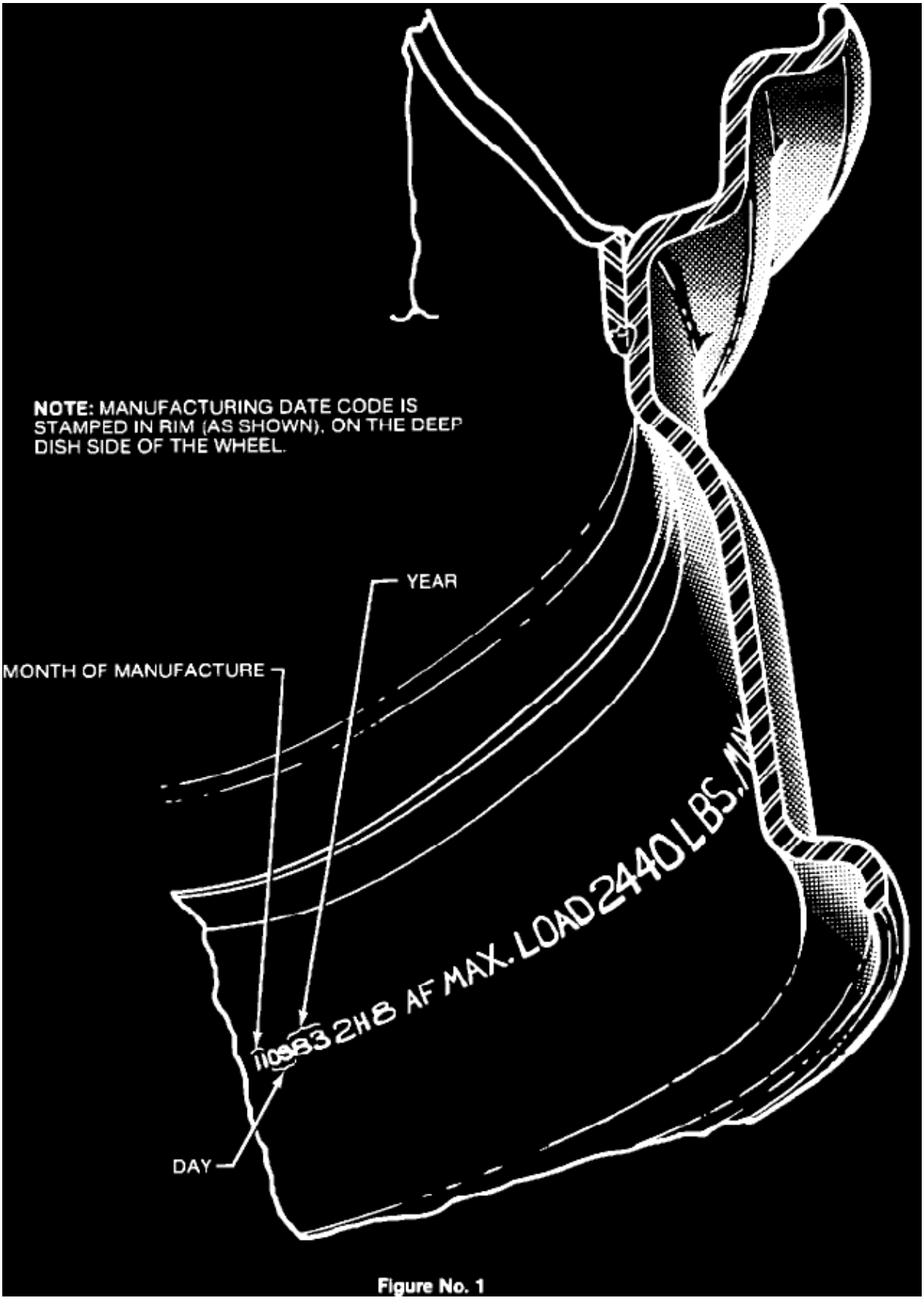


Figure No. 1

-Wheel Inspection

2. Inspect all wheels, including spare if equipped, for Manufacturing Date Code (see Figure 1).

It will be necessary to remove the rear dual wheels to inspect the inner wheel on each side.

3. If a wheel has one of the following suspect Manufacturing Date Codes or if the date code cannot be read, replace the wheel using the procedure below:

Month Day Year

7 19 84

7 20 84

7 21 84

7 22 84

7 23 84

7 24 84

7 25 84

7 26 84

4. If none of the wheels have above suspect Manufacturing Date Codes, no further action is required. Reinstall wheels as described in the 1984 Chevrolet Light Duty Truck Service Manual ST-330-84, 3E-9.

WHEEL REPLACEMENT

1. Obtain replacement wheel, P/N 14035381, and (for vehicles equipped with tubeless tires) new valve stem, P/N 274288.

2. Mask inboard and outboard sides of flat portion of wheel center section (wheel mounting surfaces) and paint with the appropriate color to match the wheel removed.

Paint is not required on the tire mounting side of rim.

3. If vehicle is equipped with tubeless tires, install new valve stem in replacement wheel.

4. Remove tire from wheel to be replaced.

5. Mount tube, if required, and tire on replacement wheel and balance the assembly (reference the 1984/1985 Light Duty Truck Service Manual ST-382-85 3E-9 for instructions).

6. Lower vehicle and install Campaign Completion label.

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PARTS INFORMATION

Parts required to complete this modification are to be obtained from the Warehousing and Distribution Division of General Motors (WDDGM). To ensure that these parts will be obtained as soon as possible, they should be ordered from WDDGM on a C.I.O. order with no special instruction code, but order on an advise code (2).

Part Number Quantity Description

14035381 As required 16 X 6 Disc Wheel

274288 As required Valve stem

IMPORTANT: Defective wheel(s) removed from the involved vehicles will be retained by the dealer in accordance with the instructions outlined in the dealers current Policy and Procedures Manual.

CLAIM INFORMATION

Submit a Product Campaign Claim with the information indicated below:

Parts Failed Parts Failure Labor Labor *Other

Count Part No. Allowance Code Operation Hours Hours

00 V2400 .6 .1

DESCRIPTION: Inspect all wheels, including spare when so equipped for date code only. Includes R & R rear dual wheels. No further action required.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14035381 00 V2401 1.6 .1 4.34

DESCRIPTION: Inspect all wheels, replace one (1) wheel only.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

4 14035381 00 V2402 2.3 .1 6.98

DESCRIPTION: Inspect all wheels and replace two (2) wheels. Number :

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CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor ***Labor Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

6 14035381 00 V2403 3.0 .1 9.62

DESCRIPTION: Inspect all wheels and replace three (3) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

8 14035381 00 V2404 3.6 .1 12.26

DESCRIPTION: Inspect all wheels and replace four (4) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

10 14035381 00 V2405 4.3 .1 14.90

DESCRIPTION: Inspect all wheels and replace five (5) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

12 14035381 00 V2406 5.0 .1 17.54

DESCRIPTION: Inspect all wheels and replace six (6) wheels.

Parts Failed **Parts Failure Labor ***Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

12 14035381 00 V2407 5.7 .1 18.30

DESCRIPTION: Inspect all wheels and replace seven (7) wheels.

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CLAIM INFORMATION (CONT'D)

*Campaign Administrative Allowance.

**The Parts Allowance should be the sum total of the current WDDGM Dealer Net price plus 30% for wheel assemblies.

***Labor Hours includes labor time for painting, paint "mix time", tire mounting, balancing, and R & R of wheel assembly from vehicle.

The Net Amount credit will automatically be given for each labor operation to cover the cost of paint, paint supplies and valve stem(s) used in conjunction with the repair.

Dealers will automatically receive the correct labor and material allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

CAMPAIGN IDENTIFICATION LABEL

Campaign Identification Label

Each vehicle modified in accordance with the instructions outlined in this Product Campaign Bulletin will require a "Campaign Identification Label." Each label provides a space to include the five digit dealer code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen. Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner.

Apply "Campaign Identification Label" only on a clean dry surface. Number :

85C02

Section : 3E

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ADMINISTRATIVE PROCEDURES

REFER TO THE CURRENT CHEVROLET SERVICE POLICIES AND PROCEDURES MANUAL AND CLAIMS PROCESSING MANUAL FOR CAMPAIGN HANDLING AND ADMINISTRATIVE PROCEDURES. Dear Chevrolet Owner:

This notice is sent to you in accordance with the requirements of the National Traffic and Motor Vehicle Safety Act.

General Motors has been notified by Firestone Steel Products that a defect which relates to motor vehicle safety exists in some Firestone Steel Products 16 X 6 disc wheels, which were installed on some 1984-1985 Chevrolet C/K30 Chassis-Cab models equipped with dual rear wheels (RPO R05). Firestone has reported that due to a possible manufacturing problem, the wheel may crack in the drop center portion of the rim. If a crack were to occur on a wheel with a tube type tire mounted to it and remain undetected, the crack could spread and eventually split the wheel resulting in rapid air pressure loss from the tire. Rapid loss of air pressure in a tire, when the vehicle is in motion, may cause loss of vehicle control and subsequent vehicle crash without prior warning.

To prevent the possibility of the condition occurring on your vehicle, please contact your Chevrolet Dealer on or after the date shown below to arrange a service date. Your dealer will inspect each wheel on your vehicle and replace it if necessary. This service will be completed at no charge to you.

Instructions for making this correction have been sent to your Chevrolet Dealer. It is estimated that parts will be available on November 13, 1984. The labor time necessary to inspect the wheels on

your vehicle is approximately 30 minutes. Additional labor time to replace your vehicles wheels if necessary, will vary between 1 and 1/2 hours and 6 hours. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

Your Chevrolet Dealer is best equipped to obtain parts and provide service to ensure your vehicle is corrected as promptly as possible. However, if you take your vehicle to your dealer on the agreed service date, and they do not remedy this condition on that date or within five days, we recommend you contact the nearest Chevrolet Zone Office, either in person or by telephone. The Zone Office will assist you and the dealer in getting your vehicle corrected. The locations and the telephone numbers of the zone offices are listed in your Owner's Manual.

After contacting your dealer and the zone office, if you are still not satisfied that we have done our best to remedy this condition without charge within a reasonable time, you may wish to write the Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590, or call 800-424-9393 (Washington D.C. residents use 426-0123). The enclosed owner reply card identifies your vehicle. Presentation of this card to your dealer will assist in making the correction in the shortest possible time. If you have sold or traded your vehicle, please let us know by completing the postage paid owner reply card and returning it to us.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your safety and continued satisfaction with our products.

Chevrolet Motor Division General Motors Corporation

Enclosure

Do not use cleaning solutions that contain hydrofluoric, oxalic and most other acids on chrome wheels (or any wheels).

If the customer is unsure of the chemical make-up of a particular wheel cleaner, it should be avoided.

For wheels showing signs of milky staining from acidic cleaners, refer to Customer Assistance and Instructions below.

Warranty of Stained Chrome Wheels

Stained wheels are not warrantable. Most acid based cleaners will permanently stain chrome wheels. Follow-up with dealers has confirmed that such cleaners were used on wheels that were returned to the Warranty Parts Center (WPC). Any stained wheels received by the WPC will be charged back to the dealership. To assist the customer, refer to Customer Assistance and Instructions below.

Pitting or Spotted Appearance of Chrome Wheels Figure 2

A second type or staining or finish disturbance may result from road chemicals, such as calcium chloride used for dust control of unpaved roads. The staining will look like small pitting (refer to Figure 2). This staining will usually be on the leading edges of each wheel spoke, but may be uniformly distributed. If a vehicle must be operated under such conditions, the chrome wheels should be washed with mild soap and water and thoroughly rinsed as soon as conveniently possible.

Important Road chemicals, such as calcium chloride used for dust control of unpaved roads, can also stain chrome wheels. The staining will look like small pitting. This staining will usually be on the leading edges of each wheel spoke. This is explained by the vehicle traveling in the forward direction while being splashed by the road chemical. If a vehicle must be operated under such conditions, the chrome wheels should be washed with mild soap and water and thoroughly rinsed as soon as conveniently possible.

Warranty of Pitted or Spotted Chrome Wheels

Wheels returned with pitting or spotting as a result of road chemicals may be replaced one time. Damage resulting from contact with these applied road chemicals is corrosive to the wheels finish and may cause damage if the wheels are not kept clean.

Important Notify the customer that this is a one time replacement. Please stress to the customer the vital importance of keeping the wheels clean if they are operating the vehicle in an area that applies calcium chloride or other dust controlling chemicals! "GM of Canada" dealers require prior approval by the District Manager - Customer Care and Service Process (DM-CCSP).

"Stardust" Corrosion of Chrome Wheels Figure 3

A third type of finish disturbance results from prolonged exposure to brake dust and resultant penetration of brake dust through the chrome. As brakes are applied hot particles of brake material are thrown off and tend to be forced through the leading edge of the wheel spoke windows by airflow. These

hot particles embed themselves in the chrome layer and create a small pit. If the material is allowed to sit on the wheel while it is exposed to moisture or salt, it will corrode the wheel beneath the

chrome leaving a pit or small blister in the chrome.

Heavy brake dust build-up should be removed from wheels by using GM Chrome Cleaner and Polish, P/N 1050173 (in Canada use 10953013). For moderate cleaning, light brake dust build-up or water spots use GM Swirl Remover Polish, P/N 12377965 (in Canada, use Meguiars Plast-X(TM) Clear Plastic Cleaner and Polish #G12310C**). After cleaning, the wheel should be waxed using GM Cleaner Wax, P/N 12377966 (in Canada, use Meguiars Cleaner Wax #M0616C**), which will help protect the wheel from brake dust and reduce adhesion of any brake dust that gets on the wheel surface. For general maintenance cleaning, PEEK Metal Polish† may be used. It will clean and shine the chrome and leave behind a wax coating that may help protect the finish.

Warranty of Stardust Corroded Chrome Wheels

Wheels returned with pitting or spotting as a result of neglect and brake dust build-up may be replaced one time.

Important Notify the customer that this is a one time replacement. Please stress to the customer the vital importance of keeping the wheels clean and free of prolonged exposure to brake dust build-up. "GM of Canada" dealers require prior approval by the District Manager - Customer Care and Service Process (DM-CCSP).

Customer Assistance and Instructions

GM has looked for ways customers may improve the appearance of wheels damaged by acidic cleaners. The following product and procedure has been found to dramatically improve the appearance of stained wheels. For wheels that have milky stains caused by acidic cleaners try the following:

Notice

THE 3M CHROME AND METAL POLISH REQUIRED FOR THIS PROCEDURE IS AN EXTREMELY AGGRESSIVE POLISH/CLEANER. THE WHEELS MUST BE CLEANED BEFORE APPLICATION TO AVOID SCRATCHING THE WHEEL SURFACE. THIS PRODUCT WILL REDUCE THE THICKNESS OF THE CHROME PLATING ON THE WHEEL AND IF USED INCORRECTLY OR EXCESSIVELY MAY REMOVE THE CHROME PLATING ALL TOGETHER, EXPOSING A LESS BRIGHT AND BRASSY COLORED SUB-LAYER. FOLLOW INSTRUCTIONS EXACTLY.

1. Wash the wheels with vigorously with soap and water. This step will clean and may reduce wheel staining. Flood all areas of the wheel with water

to rinse.

2. Dry the wheels completely.

Notice Begin with a small section of the wheel and with light pressure buff off polish and examine results. ONLY apply and rub with sufficient force and time to remove enough staining that you are satisfied with the results. Some wheels may be stained to the extent that you may only achieve a 50% improvement while others may be able to be restored to the original lustre. IN ALL CASES, only apply until the results are satisfactory.

3. Apply 3M Chrome and Metal Polish #39527* with a clean terry cloth towel. As you apply the polish, the staining will be diminished. 4. When dry, buff off the polish with a clean portion of the towel. 5. Repeat application of the 3M Chrome and Metal Polish until satisfied with the results. If continued applications fail to improve the appearance

further discontinue use.

This procedure will improve the appearance of the wheels and may, with repeated applications, restore the finish dramatically. For wheels that exhibit spotting from road chemicals the above procedure may marginally improve the condition but will not restore the finish or remove the pitting. In this type of staining the wheel finish has actually been removed in spots and no manner of cleaning will restore the finish.

†*We believe this source and their products to be reliable. There may be additional manufacturers of such products/materials. General Motors does not endorse, indicate any preference for or assume any responsibility for the products or material from this firm or for any such items that may be available from other sources.

Parts Information

Part Number	Description
12377965 G12310C (Canada)	GM Swirl Remover Polish Meguiars Plast-X Clear Plastic Cleaner & Polish
12377966 M0616C (Canada)	GM Cleaner Wax Meguiars Cleaner Wax**
1050173 (in Canada use 10953013)	GM Chrome Cleaner and Polish
39527	3M Chrome and Metal Polish* (10 oz)
33002	PEEK Polish† 100 ml Tube (www.tripeek.com)

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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*This product is currently available from 3M. To obtain information for your local retail location please call 3M at 1-888-364-3577.

**This product is currently available from Meguiars (Canada). To obtain information for your local retail location please call Meguiars at 1-800-347-5700 or at www.meguiarscanada.com.

^ This product is currently available from Tri-Peek International. To obtain information for your local retail location please call Tri-Peek at

1-877-615-4272 or at www.tripeek.com.

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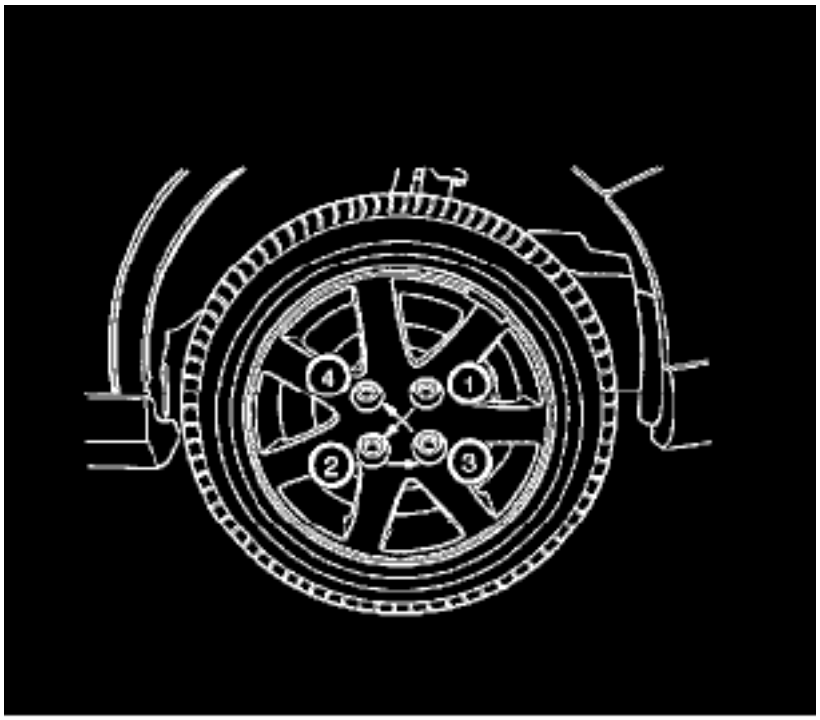
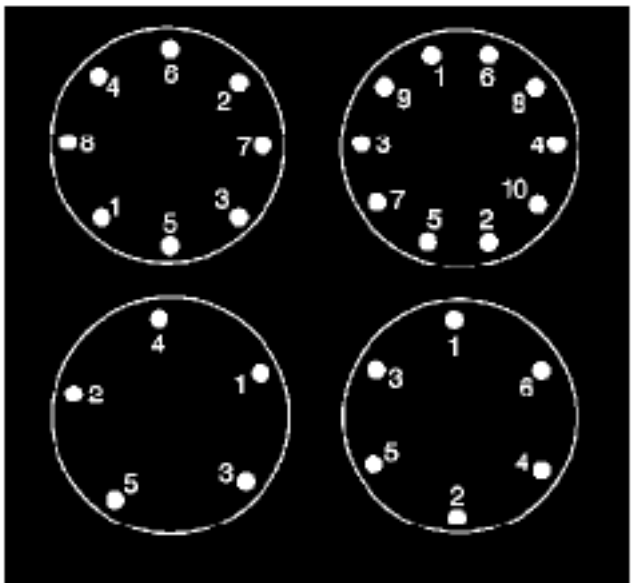
longer.

Important Whenever a wheel is refinished, the mounting surface and the wheel nut contact surfaces must not be painted or clearcoated. Coating these surfaces could affect the wheel nut torque.

When re-mounting a tire on an aluminum wheel, coated balance weights must be used in order to reduce the chance of future cosmetic damage.

Disclaimer





Some customers may use penetrating oils, grease or other lubricants on wheel studs to aid in removal or installation. Always use a suitable cleaner/solvent to remove these lubricants prior to installing the wheel and tire assemblies. Lubricants left on the wheel studs may cause improper readings of wheel nut torque. Always install wheels to clean, dry wheel studs ONLY.

Notice

Lubricants left on the wheel studs or vertical mounting surfaces between the wheel and the rotor or drum may cause the wheel to work itself loose after the vehicle is driven. Always install wheels to

clean, dry wheel studs and surfaces ONLY. Beginning with 2011 model year vehicles, put a light coating of grease, GM P/N 1051344 (in Canada, P/N 9930370), on the inner surface of the wheel pilot hole to prevent wheel seizure to the axle or bearing hub.

Wheel Stud and Lug Nut Damage

Always inspect the wheel studs and lug nuts for signs of damage from crossthreading or abuse. You should never have to force wheel nuts down the stud. Lug nuts that are damaged may not retain properly, yet give the impression of fully tightening. Always inspect and replace any component suspected of damage.

Tip

Always start wheel nuts by hand! Be certain that all wheel nut threads have been engaged BEFORE tightening the nut.

Important If the vehicle has directional tread tires, verify the directional arrow on the outboard side of the tire is pointing in the direction of forward rotation.

Wheel Nut Tightening and Torque

Improper wheel nut tightening can lead to brake pulsation and rotor damage. In order to avoid additional brake repairs, evenly tighten the wheel nuts to the proper torque specification as shown for each vehicle in SI. Always observe the proper wheel nut tightening sequence as shown below in order to avoid trapping the wheel on the wheel stud threads or clamping the wheel slightly off center resulting in vibration.

The Most Important Service You Provide

While the above information is well known, and wheel removal so common, technicians run the risk of becoming complacent on this very important

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service operation. A simple distraction or time constraint that rushes the job may result in personal injury if the greatest of care is not exercised. Make it a habit to double check your work and to always side with caution when installing wheels.

Disclaimer

INFORMATION

Bulletin No.: 00-03-10-006F

Date: May 04, 2010

Subject: Information on Tire Radial Force Variation (RFV)

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X 2000-2005 Saturn L Series 2003-2007 Saturn ION

Supercede: This bulletin is being revised to considerably expand the available information on Radial Force Variation (RFV) and should be reviewed in whole. Please discard Corporate Bulletin Number 00-03-10-006E (Section 03 - Suspension).

Important

- Before measuring tires on equipment such as the Hunter GSP9700, the vehicle MUST be driven a minimum of 16 km (10 mi) to ensure removal of any flat-spotting. Refer to Corporate Bulletin Number 03-03-10-007E - Tire/Wheel Characteristics of GM Original Equipment Tires.

- Equipment such as the Hunter GSP9700 MUST be calibrated prior to measuring tire/wheel assemblies for each vehicle.

The purpose of this bulletin is to provide guidance to GM dealers when using tire force variation measurement equipment, such as the Hunter GSP9700. This type of equipment can be a valuable tool in diagnosing vehicle ride concerns. The most common ride concern involving tire radial force variation is highway speed shake on smooth roads.

Tire related smooth road highway speed shake can be caused by three conditions: imbalance, out of round and tire force variation. These three conditions are not necessarily related. All three conditions must be addressed.

Imbalance is normally addressed first, because it is the simpler of the three to correct. Off-vehicle, two plane dynamic wheel balancers are readily available and can accurately correct any imbalance. Balancer calibration and maintenance, proper attachment of the wheel to the balancer, and proper balance weights, are all factors required for a quality balance. However, a perfectly balanced tire/wheel assembly can still be "oval shaped" and cause a vibration.

Before balancing, perform the following procedures.

Tire and Wheel Diagnosis

1. Set the tire pressure to the placard values. 2. With the vehicle raised, ensure the wheels are centered on the hub by loosening all wheel nuts and hand-tightening all nuts first by hand while

shaking the wheel, then torque to specifications using a torque wrench, NOT a torque stick.

3. Visually inspect the tires and the wheels. Inspect for evidence of the following conditions and correct as necessary:

- Missing balance weights

- Bent rim flange

- Irregular tire wear

- Incomplete bead seating

- Tire irregularities (including pressure settings)

- Mud/ice build-up in wheel

- Stones in the tire tread

- Remove any aftermarket wheels and/or tires and restore vehicle to original condition prior to diagnosing a smooth road shake condition.

4. Road test the vehicle using the Electronic Vibration Analyzer (EVA) essential tool. Drive for a sufficient distance on a known, smooth road

surface to duplicate the condition. Determine if the vehicle is sensitive to brake apply. If the brakes are applied lightly and the pulsation felt in the steering wheel increases, refer to the Brakes section of the service manual that deals with brake-induced pulsation. If you can start to hear the vibration as a low boom noise (in addition to feeling it), but cannot see it, the vehicle likely has a first order (one pulse per propshaft revolution) driveline vibration. Driveline first order vibrations are high enough in frequency that most humans can start to hear them at highway speeds, but are too high to be able to be easily seen. These issues can be caused by driveline imbalance or misalignment. If the vehicle exhibits this low boom and the booming pulses in-and-out on a regular basis (like a throbbing), chances are good that the vehicle could have driveline vibration. This type

P-Metric tires of passenger cars	18 lbs (8 kg) or less
P-Metric tires on light trucks	24 lbs (11 kg) or less
LT-tires on light trucks	35 lbs (16 kg) or less

of vibration is normally felt more in the "seat of the pants" than the steering wheel.

5. Next, record the Hertz (Hz) reading as displayed by the EVA onto the tire data worksheet found at the end of this bulletin. This should be done

after a tire break-in period of at least 16 km (10 mi) at 72 km/h (45 mph) or greater, in order to eliminate any possible tire flat-spotting. This reading confirms what the vehicle vibration frequency is prior to vehicle service and documents the amount of improvement occurring as the result of the various steps taken to repair. Completing the Steering Wheel Shake Worksheet below is required. A copy of the completed worksheet must be saved with the R.O. and a copy included with any parts returned to the Warranty Parts Center for analysis. A reading of 35 to 50 Hz typically indicates a first order propshaft vibration. If this is the situation, refer to Corporate Bulletin Number 08-07-30-044D. Generally, a reading between 10 and 20 Hz indicates a tire/wheel vibration and if this is the reading obtained, continue using this bulletin. If the tire 1st order vibration goes away and stays away during this evaluation, the cause is likely tire flat-spotting. Tire flat-spotting vibration may come and go at any speed over 72 km/h (45 mph) during the first 10 minutes of operation, if vibration continues after 10 minutes of driving at speeds greater than 72 km/h (45 mph), tire flat-spotting can be ruled out as the cause for vibration.

6. If flat-spotting is the cause, provide the explanation that this has occurred due to the vehicle being parked for long periods of time and that the

nature of the tire is to take a set. Refer to Corporate Bulletin Number 03-03-10-007E: Information on Tire/Wheel Characteristics (Vibration, Balance, Shake, Flat Spotting) of GM Original Equipment Tires.

7. If the road test indicates a shake/vibration exists, check the imbalance of each tire/wheel assembly on a known, calibrated, off-car dynamic

balancer.Make sure the mounting surface of the wheel and the surface of the balancer are absolutely clean and free of debris. Be sure to chose the proper cone/collet for the wheel, and always use the pilot bore for centering. Never center the wheel using the hub-cap bore since it is not a precision machined surface. If any assembly calls for more than 1/4 ounce on either rim flange, remove all balance weights and rebalance to as close to zero as possible. If you can see the vibration (along with feeling it) in the steering wheel (driving straight without your hands on the wheel), it is very likely to be a tire/wheel first order (one pulse per revolution) disturbance. First order disturbances can be caused by imbalance as well as non-uniformities in tires, wheels or hubs. This first order frequency is too low for a human to hear, but if the amplitude is high enough, it can be seen.

If a vibration or shake still exists after balancing, any out of round conditions, of the wheel, and force variation conditions of the tire, must be addressed. Equipment such as the Hunter GSP9700 can address both (it is also a wheel balancer).

Tire radial force vibration (RFV) can be defined as the amount of stiffness variation the tire will produce in one revolution under a constant load. Radial force variation is what the vehicle feels because the load (weight) of the vehicle is always on the tires. Although free runout of tires (not under load) is not always a good indicator of a smooth ride, it is critical that total tire/wheel

assembly runout be within specification.

Equipment such as the Hunter GSP9700 loads the tire, similar to on the vehicle, and measures radial force variation of the tire/wheel assembly. Note that the wheel is affecting the tire's RFV measurement at this point. To isolate the wheel, its runout must be measured. This can be easily done on the Hunter, without the need to set up dial indicators. If the wheel meets the runout specification, the tire's RFV can then be addressed.

After measuring the tire/wheel assembly under load, and the wheel alone, the machine then calculates (predicts) the radial force variation of the tire. However, because this is a prediction that can include mounting inaccuracies, and the load wheel is much smaller in diameter than used in tire production, this type of service equipment should NOT be used to audit new tires. Rather, it should be used as a service diagnostic tool to minimize radial force variation of the tire/wheel assembly.

Equipment such as the Hunter GSP9700 does an excellent job of measuring wheel runout, and of finding the low point of the wheel (for runout) and the high point of the tire (for radial force variation). This allows the tire to be matched mounted to the wheel for lowest tire/wheel assembly force variation.

The machine will simplify this process into easy steps. The following assembly radial force variation numbers should be used as a guide:

When measuring RFV and match mounting tires perform the following steps.

Measuring Wheel Runout and Assembly Radial Force Variation

Important The completed worksheet at the end of this bulletin must be attached to the hard copy of the repair order.

- Measure radial force variation and radial runout.

- If a road force/balancing machine is used, record the radial force variation (RFV) on the worksheet at the end of this bulletin. It may be of benefit to have the lowest RFV assembly to the front left corner. If the machine is not available and the EVA data suggests there is an issue, swap the tire and wheel assemblies from the front to the back. Re-check on the EVA and if the problem still exists, test another vehicle to find tires that do not exhibit the same frequency and swap those tires onto the subject vehicle.

- If a runout/balancing machine is used, record the radial runout of the tire/wheel assemblies on the worksheet at the end of this bulletin. If one or more of the tire/wheel assemblies are more than.040 in (1.02 mm), match mount the tire to the wheel to get below.040 in (1.02 mm). For sensitive customers, readings of 0.030 inch (0.76 mm) or less are preferable, it may also be of benefit to have the lowest runout assembly to the front left corner. If the machine is not available and the EVA data suggests there is an issue, swap the tire and wheel assemblies from the front to the back. Re-check on the EVA and if the problem still exists, test another vehicle to find tires that do not exhibit the same frequency and swap those tires

onto the subject vehicle.

- After match mounting, the tire/wheel assembly must be rebalanced.

If match mounting tires to in-spec wheels produces assembly values higher than these, tire replacement may be necessary. Replacing tires at lower values will probably mean good tires are being condemned. Because tires can sometimes become temporarily flat-spotted, which will affect force variation, it is important that the vehicle be driven at least 16 km (10 mi) prior to measuring. Tire pressure must also be adjusted to the usage pressure on the vehicle's tire placard prior to measuring.

Most GM vehicles will tolerate radial force variation up to these levels. However, some vehicles are more sensitive, and may require lower levels. Also, there are other tire parameters that equipment such as the Hunter GSP9700 cannot measure that may be a factor. In such cases, TAC should be contacted for further instructions.

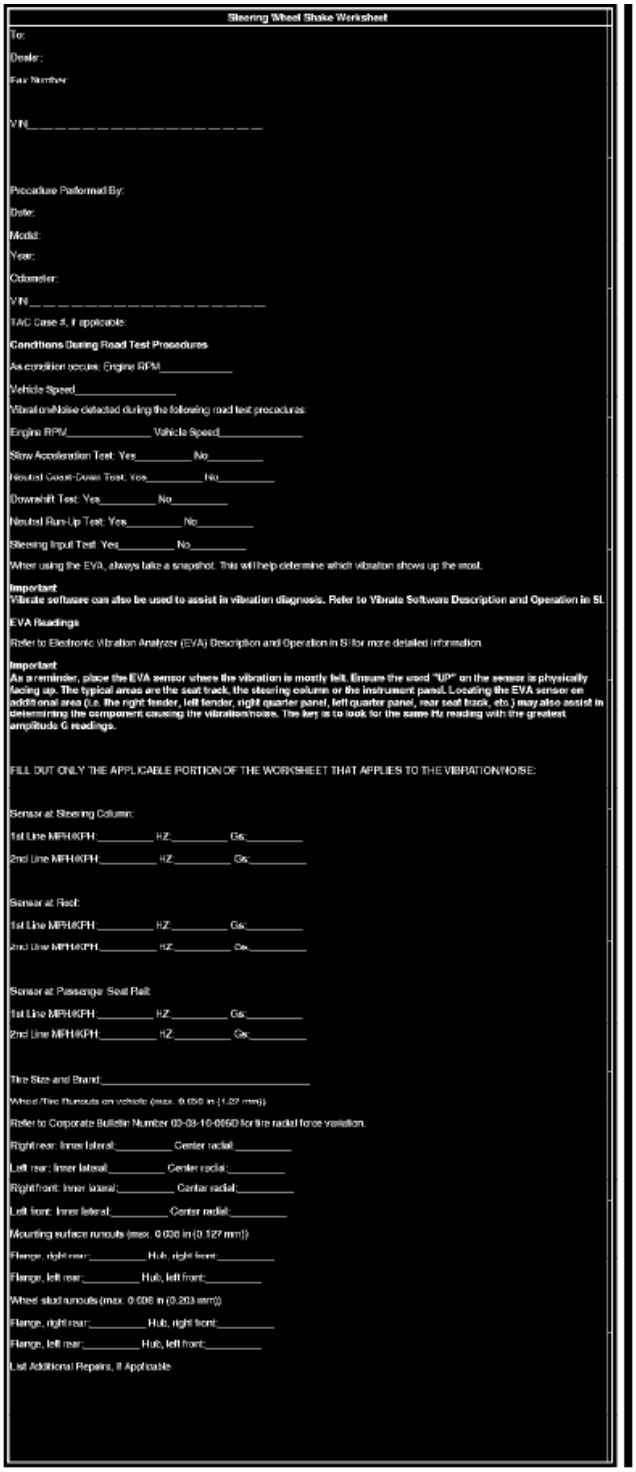
Important

- When mounting a GM wheel to a wheel balancer/force variation machine, always use the wheel's center pilot hole. This is the primary centering mechanism on all GM wheels; the bolt holes are secondary. Usually a back cone method to the machine should be used. For added accuracy and repeatability, a flange plate should be used to clamp the wheel onto the cone and machine. This system is offered by all balancer manufacturers in GM's dealer program.

- Any type of service equipment that removes tread rubber by grinding, buffing or truing is NOT recommended, and may void the tire warranty. However, tires may have been ground by the tire company as part of their tire manufacturing process. This is a legitimate procedure.

Steering Wheel Shake Worksheet

When diagnosing vibration concerns, use the following worksheet in conjunction with the appropriate Vibration Analysis-Road testing procedure in the Vibration Correction sub-section in SI.



Steering Wheel Shake Worksheet

To:

Dealer:

Fax Number:

VIN_ _

Procedure Performed By:

Date:

Model:

Year:

Odometer:

VIN_ _

TAC Case #, if applicable:

Conditions During Road Test Procedures

As condition occurs: Engine RPM_____

Vehicle Speed_____

Vibration/Noise detected during the following road test procedures:

Engine RPM_____ Vehicle Speed_____

Slow Acceleration Test: Yes_____ No_____

Neutral Coast-Down Test: Yes_____ No_____

Downshift Test: Yes_____ No_____

Neutral Run-Up Test: Yes_____ No_____

Steering Input Test: Yes_____ No_____

When using the EVA, always take a snapshot. This will help determine which vibration shows up the most.

Important
Vibrate software can also be used to assist in vibration diagnosis. Refer to Vibrate Software Description and Operation in SI.

EVA Readings

Refer to Electronic Vibration Analyzer (EVA) Description and Operation in SI for more detailed information.

Important
As a reminder, place the EVA sensor where the vibration is mostly felt. Ensure the word "UP" on the sensor is physically facing up. The typical areas are the seat track, the steering column or the instrument panel. Locating the EVA sensor on additional area (i.e. the right fender, left fender, right quarter panel, left quarter panel, rear seat track, etc.) may also assist in determining the component causing the vibration/noise. The key is to look for the same Hz reading with the greatest amplitude G readings.

FILL OUT ONLY THE APPLICABLE PORTION OF THE WORKSHEET THAT APPLIES TO THE VIBRATION/NOISE:

Sensor at Steering Column:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Sensor at Rear:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Sensor at Passenger Seat Rail:

1st Line MPH/KPH:_____ HZ:_____ Gs:_____

2nd Line MPH/KPH:_____ HZ:_____ Gs:_____

Tire Size and Brand:_____

Wheel/Tire Runouts on vehicle (max. 0.050 in (1.27 mm))

Refer to Corporate Bulletin Number 03-03-10-006D for tire radial force variation.

Right rear: Inner lateral:_____ Center radial:_____

Left rear: Inner lateral:_____ Center radial:_____

Right front: Inner lateral:_____ Center radial:_____

Left front: Inner lateral:_____ Center radial:_____

Mounting surface runouts (max. 0.005 in (0.127 mm))

Flange, right rear:_____ Hub, right front:_____

Flange, left rear:_____ Hub, left front:_____

Wheel stud runouts (max. 0.008 in (0.203 mm))

Flange, right rear:_____ Hub, right front:_____

Flange, left rear:_____ Hub, left front:_____

List Additional Repairs, If Applicable:

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Refer to the appropriate section of SI for specifications and repair procedures that are related to the vibration concern.

Disclaimer

TECHNICAL

Bulletin No.: 05-03-10-003F

Date: April 27, 2010

Subject: Low Tire Pressure, Leaking Cast Aluminum Wheels (Repair with Adhesive Sealant)

Models:

2011 and Prior GM Passenger Cars and Light Duty Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X with Cast Aluminum Wheels

Supercede: This bulletin is being revised to update the model years and the bulletin reference information. Please discard Corporate Bulletin Number 05-03-10-003E (Section 03 - Suspension).

Condition

Some customers may comment on a low tire pressure condition.

Diagnosis of the low tire pressure condition indicates an air leak through the cast aluminum wheel.

Cause

Porosity in the cast aluminum wheel may be the cause.

Notice

This bulletin specifically addresses issues related to the wheel casting that may result in an air leak. For issues related to corrosion of the wheel in service, please refer to Corporate Bulletin Number 08-03-10-006C - Tire Slowly Goes Flat, Tire Air Loss, Low Tire Pressure Warning Light Illuminated, Aluminum Wheel Bead Seat Corrosion (Clean and Resurface Wheel Bead Seat).

Correction

1. Remove the tire and wheel assembly from the vehicle. Refer to the appropriate service procedure in SI. 2. Locate the leaking area by inflating the tire to 276 kPa (40 psi) and dipping the tire/wheel assembly in a water bath, or use a spray bottle with soap

and water to locate the specific leak location.

Important

- If the porosity leak is located in the bead area of the aluminum rim (where the tire meets the rim), the wheel should be replaced.

- If two or more leaks are located on one wheel, the wheel should be replaced.

3. If air bubbles are observed, mark the location.

- If the leak location is on the tire/rubber area, refer to Corporate Bulletin Number 04-03-10-001F - Tire Puncture Repair Procedures for All Cars and Light Duty Trucks.

- If the leak is located on the aluminum wheel area, continue with the next step.

4. Inscribe a mark on the tire at the valve stem in order to indicate the orientation of the tire to the wheel. 5. Dismount the tire from the wheel. Refer to Tire Mounting and Dismounting. 6. Remove the tire pressure sensor. Refer to Tire Pressure Sensor removal procedure in SI. 7. Scuff the INSIDE rim surface at the leak area with #80 grit paper and clean the area with general purpose cleaner, such as 3M(R) General Purpose

Adhesive Cleaner, P/N 08984, or equivalent.

8. Apply a 3 mm (0.12 in) thick layer of Silicone - Adhesive/Sealant, P/N 12378478 (in Canada, use 88900041), or equivalent, to the leak area. 9. Allow for the adhesive/sealant to dry.

Notice Caution must be used when mounting the tire so as not to damage the sealer. Damaging the repair area may result in an air leak.

Part Number	Description
12378478 (in Canada, use 88900041)	Silicone - Adhesive/Sealant
3M(R) 08984	3M(R) General Purpose Adhesive Cleaner

Labor Operation	Description	Labor Time
E0420	Wheel - One - R&R Or Replace	Use Published Labor operation Time
Add:	To Repair Porosity On Aluminum Wheel	
Add:	To Repair Each Additional Wheel	

Labor Operation	Description	Failed Object	Fault/Reason	Location Code	Warranty Type	Repair/Action Code	Labor Time
7711001	Wheel - One - R&R Or Replace	77110	55	3-left 4-right 5-all	01	05	Use Published Labor Operation Time
add 7711003	To Repair Porosity On Aluminum Wheel	-	-	-	-	-	0.1 hr
add 7711002	To Repair Each Additional Wheel	-	-	-	-	-	Use Published Labor Operation Time

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WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

10. Align the inscribed mark on the tire with the valve stem on the wheel. 11. Reinstall the Tire Pressure Sensor. Refer to Tire Pressure Sensor installation procedure in SI. 12. Mount the tire on the wheel. Refer to Tire Mounting and Dismounting. 13. Pressurize the tire to 276 kPa (40 psi) and inspect for leaks. 14. Adjust tire pressure to meet the placard specification. 15. Balance the tire/wheel assembly. Refer to Tire and Wheel Assembly Balancing - Off-Vehicle. 16. Install the tire and wheel assembly onto the vehicle. Refer to the appropriate service procedure in SI.

Parts Information

Warranty Information (excluding Saab U.S. Models)

Important The Silicone - Adhesive/Sealant comes in a case quantity of six. ONLY charge warranty one tube of adhesive/sealant per wheel repair.

For vehicles repaired under warranty, use:

One leak repair per wheel.

Warranty Information (Saab U.S. Models)

For vehicles repaired under warranty, use the table above.

Disclaimer

sure the retainer cup is tree from dirt, grease, and gouges. Most wheel balancers now offer this type of protected retainer.

DO NOT allow the retainer cup to rotate against the wheel's surface when tightening the wheel to the balancer.

DO NOT OVERTIGHTEN. Most balancers use a large "wing nut" design to clamp the retainer against the wheel. Hand tight is sufficient.

This procedure will allow accurate balancing using the conventional back cone method.

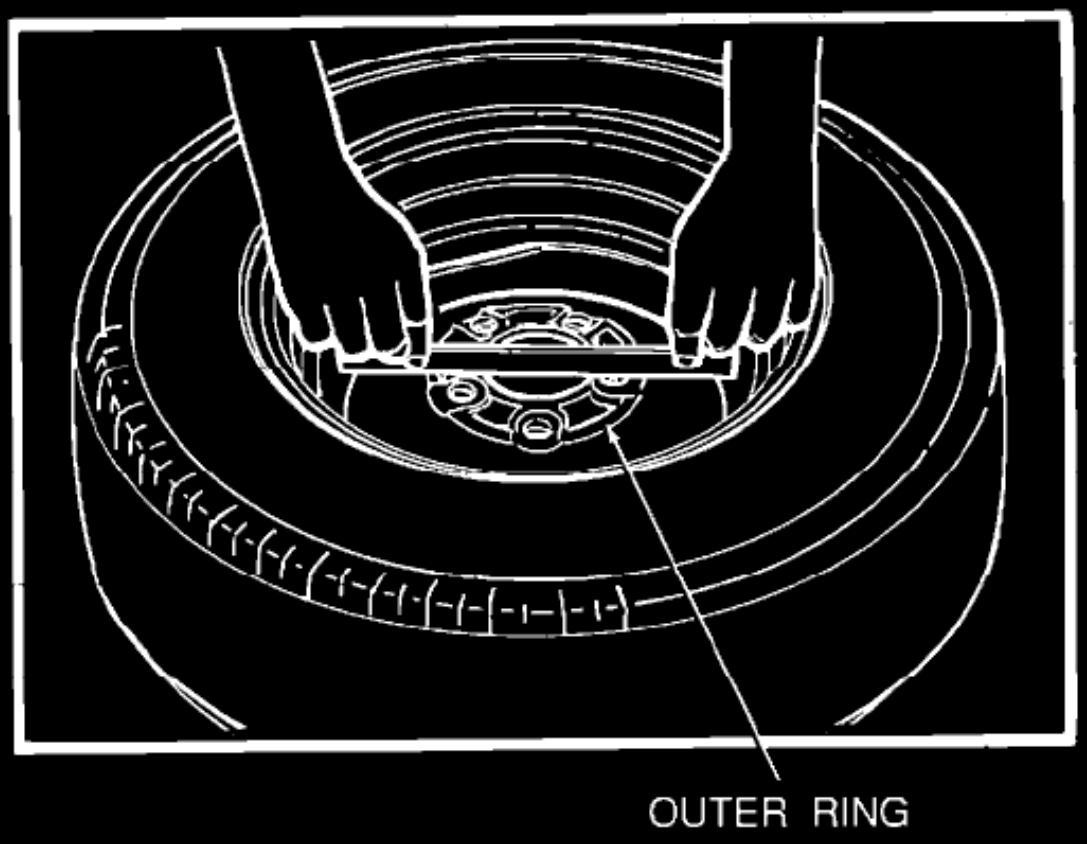
Important:

Coated balance weights must be used on aluminum wheels to prevent damage to the rim flange.

Except for the N9O 4X4 wheel used on T trucks, all light truck aluminum wheels will accept either "AW" series or "MO" series clip-on coated weights on both the inside and outside rim flanges. The N9O T truck wheel will accept "AW" series weights on the inside rim flange only. The outside rim flange is not designed to accept a clip-on weight. If such a weight installation is attempted, a poor fit will result, and the weight may fall off and/or cause cosmetic damage to the rim flange. This wheel can be 1) static balanced by clipping all the weight on the inside rim flange (as is done in the assembly plant), or 2) dynamic balanced by clipping a weight on the inside flange and using an adhesive weight near the outside flange.

The charts show "AW" and "MC" balance weight usage. These original equipment coated weights are available at competitive prices through the GM Dealer Equipment program.

STRAIGHT EDGE PROCEDURE

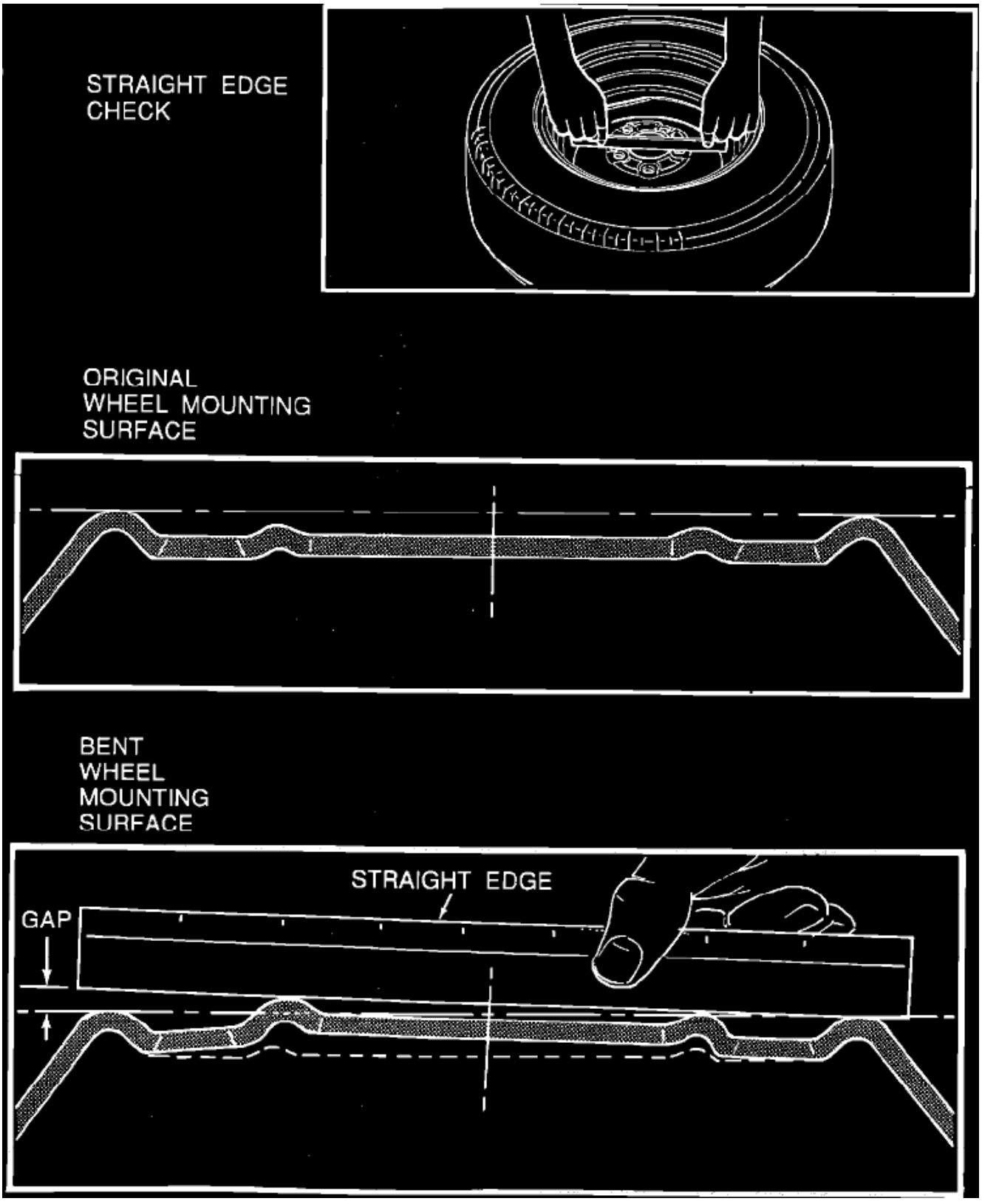


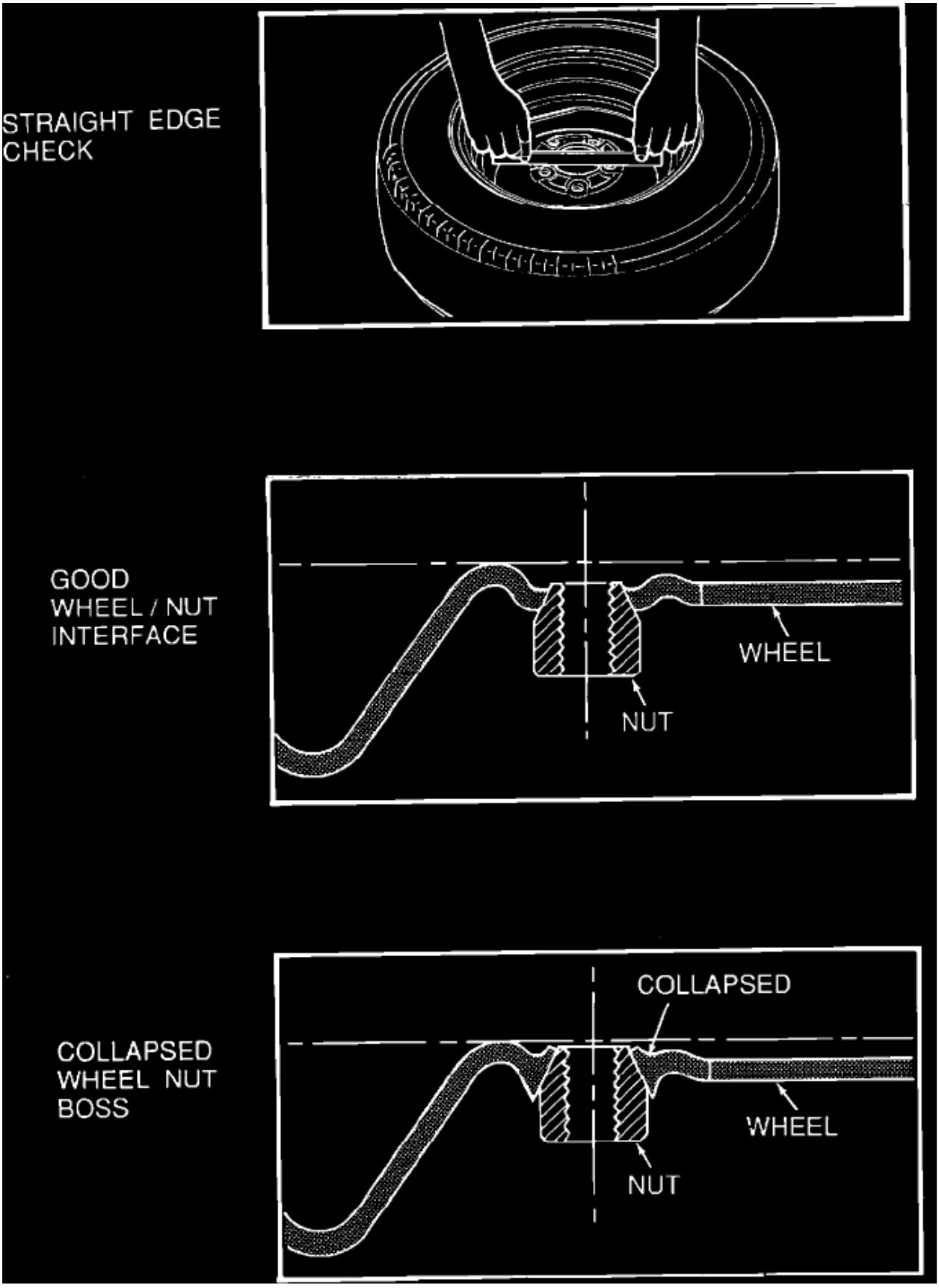
A. Obtain a straight edge approximately 8 - 9 inches long and, while holding it in two hands as shown, place it on the mounting surface of the wheel and try to rock it up and down.

B. Repeat the above procedure on three or four different positions on the wheel mounting surface.

C. The outer ring of the mounting surface is normally raised above everything inside it. If a wheel mounting surface has been bent on a tire changer, it will be raised above the outer ring and the straight edge will rock on this "raised" portion.

D. If a bent wheel is found, it must be replaced.


STRAIGHT EDGE CHECK
ORIGINAL WHEEL MOUNTING SURFACE
BENT WHEEL MOUNTING SURFACE
STRAIGHT EDGE
GAP



A. Obtain a straight edge approximately 8-9 inches long and, while holding it in two hands, as shown in the attached illustration, place it on the inboard mounting surface of the wheel and try to

rock it up and down.

B. Repeat the above procedure on three or four different positions on the wheel inboard mounting surface.

C. The outer ring of the mounting surface is normally raised above everything inside it. If a wheel mounting surface has been bent on a tire changer, it will be raised above the outer ring and the straight edge will rock on this "raised" portion.

D. If a bent wheel is found, it must be replaced.

II. OVER TORQUING OF WHEEL NUTS:

1. A TORQUE WRENCH MUST BE USED to insure that the wheel nuts are tightened to specification. This should be done in two steps using the star pattern. First, snug the nuts down by hand. Then, using the star pattern and a torque wrench, tighten the wheel nuts to about half the final torque. Finally, tighten the wheel nuts to specification using the star pattern and a torque wrench.

2. NEVER use lubricants or penetrating fluids on wheel studs, nuts, or mounting surfaces, as this can raise the actual torque on the nut without a corresponding torque reading on the wrench. Wheel nuts, studs, and mounting surfaces must be clean and dry.

1990-1991 "W" Car

1988-1990 "Y" Car "AW" Type Weight

1989-1991 "L" Car Used On All Other

1991 "B" Car, "U" Van Series Vehicles

2-1/4 oz. 9591382 9591366

2-1/2 oz. 9591383 9591367

3oz. 9591385 9591369

Parts are currently available from GMSPO.

Dealers should make sure they have a supply of both types weights for balancing GM aluminum wheels.

When installing the coated weights, care must be taken so that the coating does not crack. It is recommended that a Teflon tipped hammer be used, such as 85403 Nicholson Industrial Hammer, their part number CAS 3340551, available through the Charles Strelinger Company, Warren, Mi (313-268-4100), or equivalent.

Wheel Bearing: Adjustments Front

Two Wheel Drive - 2WD

FRONT WHEEL BEARINGS ADJUSTMENT

1. While rotating wheel forward, torque spindle nut to 12 ft. lbs.

2. Back off nut until ``just loose'' then hand tighten nut and back it off again until either hole in spindle lines up with hole in nut. Do not back off nut more than 1/2 flat.

3. Install new cotter pin. With wheel bearing properly adjusted, there will be .001---.005 inch endplay.

Four Wheel Drive - 4WD

For Front Wheel Bearing Adjustment Procedures on four wheel drive models refer to Locking Hub/Adjustments.

Wheel Bearing: Adjustments Rear

Chevrolet Full Floating Axle

REAR WHEEL BEARINGS ADJUSTMENT

Before checking wheel bearing adjustment, make sure brakes are fully released and do not drag. Check bearing play by grasping tire at top and pulling back and forth or by using a pry bar under tire. If bearings are properly adjusted, movement of brake drum in relation to brake flange plate will be barely noticeable and wheel will turn freely. If movement is excessive, adjust bearings as follows:

1. Raise vehicle until wheel is free to rotate, then remove axle shaft.

2. Disengage retainer tang and remove retainer from axle housing tube.

3. Torque adjusting nut to 50 ft. lbs. while rotating hub assembly. Ensure bearing cones are seated and in contact with spindle shoulder.

4. Back off adjusting nut until just loose.

5. Insert key into adjusting nut slot, if equipped. Install snap ring to retain key in position.

6. Lower vehicle, then install axle shaft.

GMC Single Speed Axle

REAR WHEEL BEARINGS ADJUSTMENT

1. Raise and support rear axle.

2. Remove axle shaft as outlined previously. Release brakes.

3. Disengage retainer tang from locknut, then remove locknut and retainer from axle housing tube.

4. Torque inner adjusting nut to 50 ft. lbs. while rotating wheel, then back off nut 1/8 of a turn.

5. Install retainer so that short tang engages nearest slot on adjusting nut.

6. Install outer locknut and torque to 250 ft. lbs., then bend long tang of retainer into slot of outer nut.

Timken (Rockwell) Axle

REAR WHEEL BEARINGS ADJUSTMENT

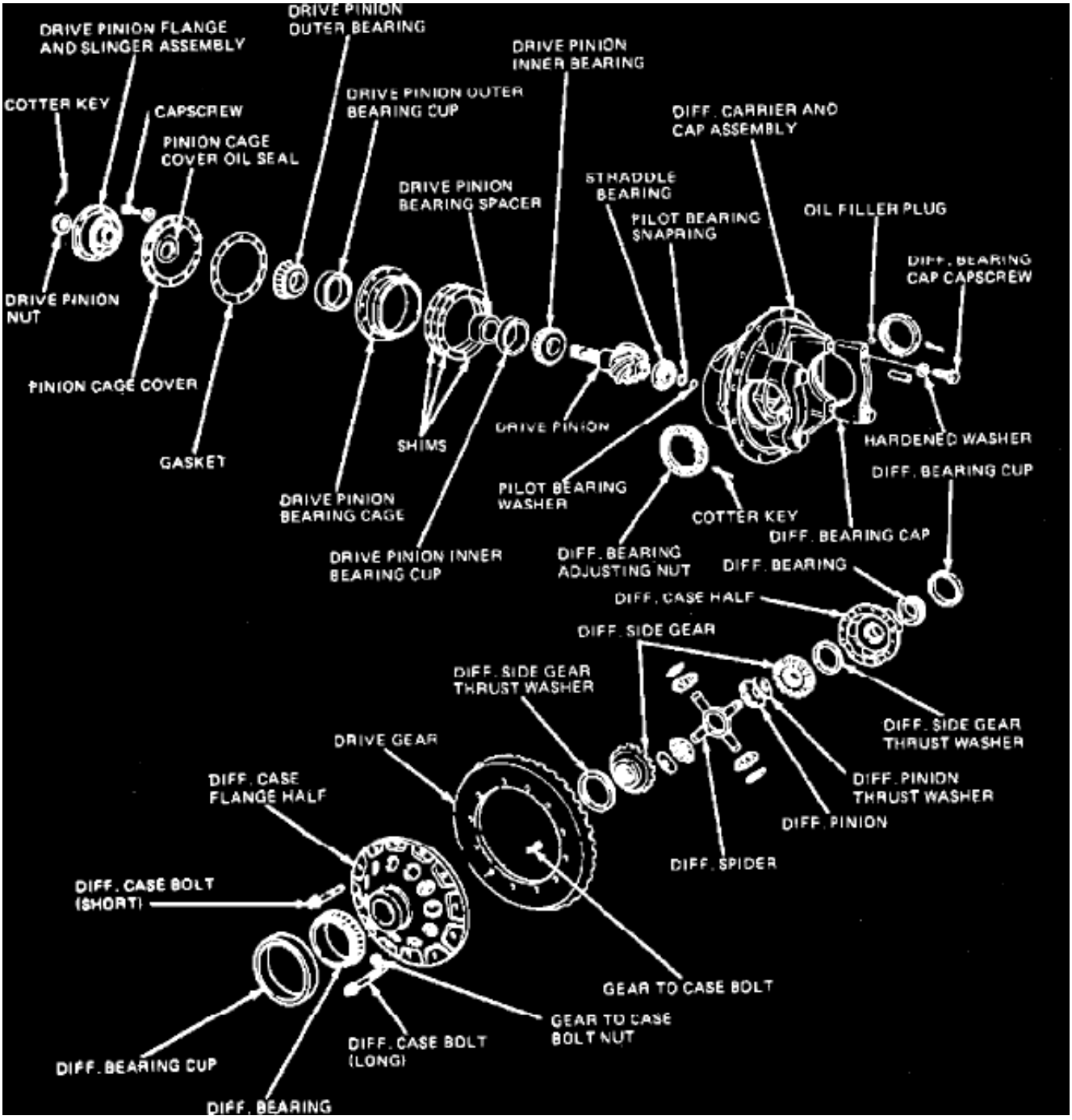


Fig. 12 Timken (Rockwell) axle w/12 inch ring gear

This axle, Fig. 12, employs a heavy duty hypoid drive pinion and ring gear. The differential and gear assembly is mounted on tapered roller bearings. The straddle mounted pinion has two tapered roller bearings in front of the pinion teeth which take the forward and reverse thrust, while a third bearing behind the pinion teeth carries the radial load.

AXLE HOUSING, REPLACE Refer to ``Chevrolet Full Floating Axles'' for axle housing replacement procedures, since procedures are identical for both axles.

AXLE SHAFT, REPLACE

1. Remove hub cap, then install slide hammer adapter into tapped hole in axle flange.

2. Attach slide hammer onto adapter, then remove axle shaft from housing.

3. Install axle shaft, ensuring flange and hub splines align.

4. Install new gasket, position flange to hub, then install attaching bolts and tighten to specifications.

WHEEL BEARINGS, ADJUST

1. Remove axle shaft as outlined previously.

2. Raise and support vehicle.

3. Disengage retainer tang from locknut, then remove locknut and retainer from axle housing tube.

4. While rotating wheel, torque inner adjusting nut to 50 ft. lbs., then back off nut 1/8 of a turn.

5. Install retainer so that short tang engages nearest slot on adjusting nut.

6. Install outer locknut and torque to 250 ft. lbs., then bend long tang of retainer into slot of outer nut.

Wheel Bearing: Service and Repair Front

Coil Spring Suspension

FRONT WHEEL BEARINGS AND/OR HUB

1. Raise and support vehicle, then remove wheel and tire assembly.

2. Remove hub cap and cotter pin.

3. Remove brake caliper. Do not allow caliper to hang from brake hose.

4. Remove retaining nut, then the hub and disc assembly.

5. Remove outer wheel bearing.

6. To remove inner bearing, pry out grease seal, then remove seal and inner bearing.

7. Reverse procedure to install, then adjust wheel bearings as previously described.

Leaf Spring Suspension

FRONT WHEEL BEARINGS AND/OR HUB

1. Raise and support vehicle.

2. Remove dust cap, if equipped.

3. Remove locking hub as outlined under LOCKING HUBS.

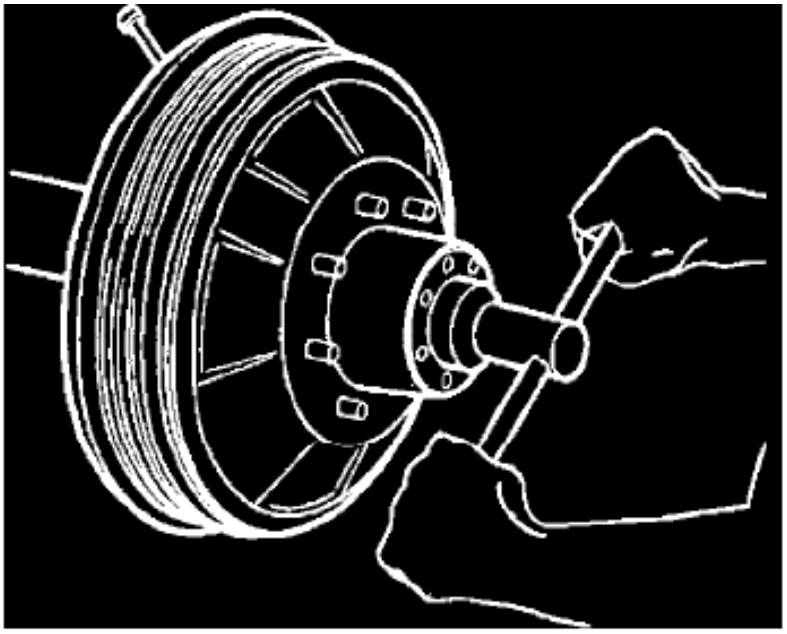
4. Remove disc brake caliper and position aside. Do not allow caliper to hang from brake hose.

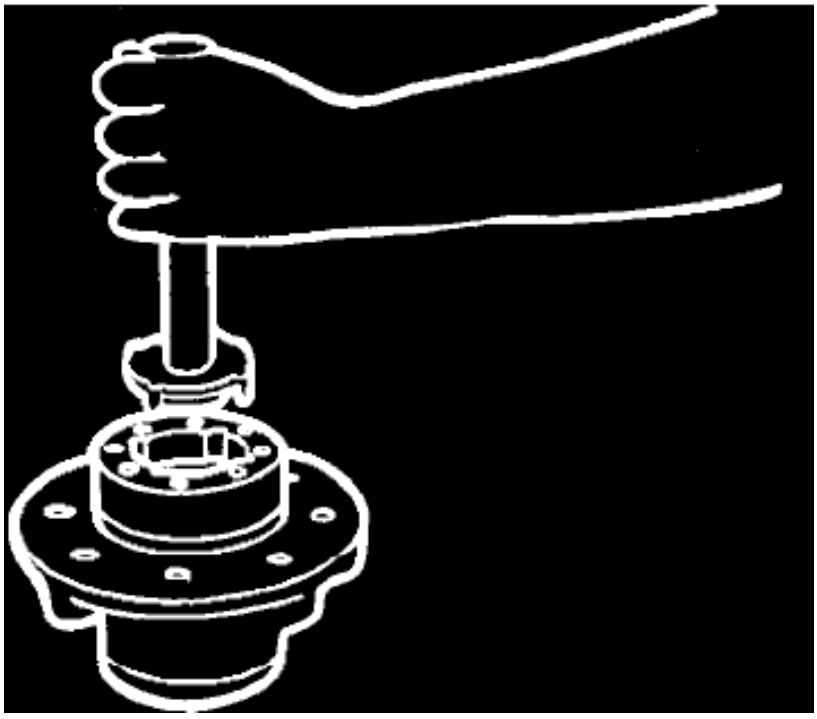
5. Remove wheel bearing outer locknut, lock ring and wheel bearing inner adjusting nut.

6. Remove hub and disc assembly, and outer wheel bearing.

7. Remove oil seal, inner wheel bearing and inner and outer bearing cups using a suitable drift.

8. Reverse procedure to install. Adjust wheel bearings as outlined under ADJUSTMENT PROCEDURE/WHEEL BEARING.





Wheel Bearing: Service and Repair Rear

Chevrolet Full Floating Axle

REAR WHEEL BEARINGS

Fig. 5 Removing bearing adjusting nut locknut

Hub & Drum, Remove

1. Remove wheel and axle shaft.

2. Disengage tang of nut lock from slot or flat of locknut, then remove locknut from housing tube, using appropriate tool, Fig. 5.

3. Disengage tang of nut lock from slot or flat of adjusting nut and remove nut lock from housing tube.

4. Use appropriate tool, Fig. 5, to remove adjusting nut from housing tube. Remove thrust washer from housing tube.

5. Pull hub and drum straight off axle housing.

Fig. 6 Removing outer bearing & cup

Bearing & Cup, Replace

1. Using a hammer and suitable drift, drive inner bearing, cup and seal from hub assembly.

2. Remove outer bearing snap ring using suitable pliers.

3. Using tools J-24426 and J-8092, Fig. 6, drive outer bearing and cup from hub assembly.

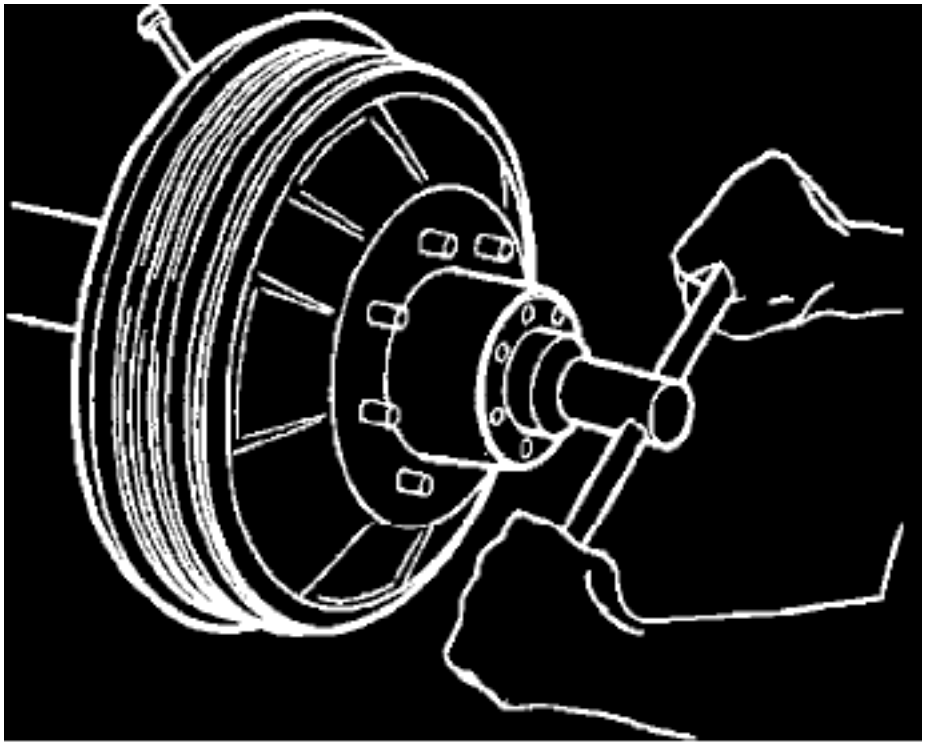
4. Install new outer bearing into hub assembly.

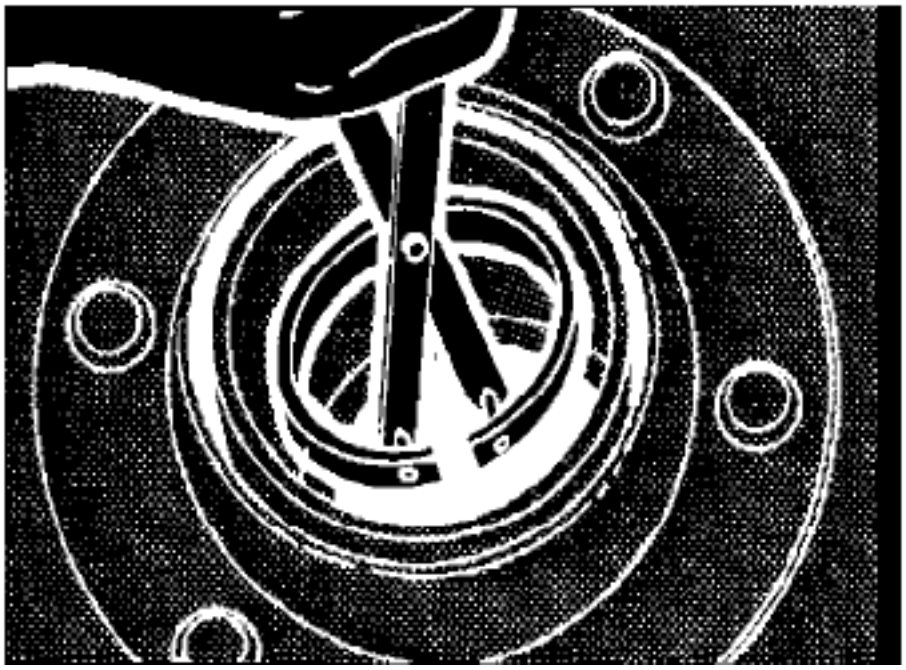
5. Install outer bearing cup using tools mentioned in Step 3. Drive cup beyond snap ring groove. Install outer bearing cup with tool J-8092 positioned upside down to prevent chamfer on tool from damaging cup.

6. Install snap ring into groove using suitable pliers.

7. Using tool J-24426, drive cup against snap ring.

8. Install inner bearing cup using tools J-24427 and J-8092. Drive cup into position until it seats against shoulder of hub bore.





9. Install new oil seal.

Chevrolet Salisbury Type Semi-Floating Axle

REAR WHEEL BEARINGS

1. Remove axle shaft as previously described.

2. Use a suitable puller to remove bearing and oil seal.

3. Lubricate wheel bearing and cavity between seal lips with wheel bearing lubricant before installation.

4. Reverse procedure to install.

GMC Single Speed

REAR WHEEL BEARINGS

Fig. 5 Removing bearing adjusting nut locknut

Fig. 9 Removing bearing retainer ring

1. Remove wheel and axle shaft.

2. Disengage tang of retainer from slot or flat of locknut, then remove locknut from housing tube, Fig. 5.

3. Disengage tang of retainer from slot or flat of adjusting nut, then remove retainer.

4. Using tool shown in Fig. 5, remove adjusting nut from housing tube. Remove thrust washer.

5. Pull hub and drum assembly off axle housing. Remove oil seal and discard.

6. Using a suitable steel bar and an arbor press, press inner bearing cup from hub.

7. Using a suitable pliers, remove outer bearing retaining ring, Fig. 9.

8. Using an old axle shaft or equivalent, drive on axle shaft spacer to remove outer bearing assembly from hub.

9. Position axle shaft spacer and outer bearing into hub, ensuring larger side of bearing faces outer end of hub.

10. Position outer bearing cup into hub with thin edge facing toward outer end of hub, then press cup into hub.

11. Install retaining ring, then press cup into contact with ring.

12. Drive inner bearing cup into hub, then install new oil seal.

13. Reverse Steps 1 through 5 to complete installation, then adjust wheel bearings as outlined in ``Wheel Bearing, Adjust'' procedure.

Wheel Hub: Service and Repair

FRONT HUB/BEARING

1. Raise and support vehicle.

2. Remove dust cap, if equipped.

3. Remove locking hub as outlined under ``Locking Hub Service.''

4. Remove disc brake caliper and position aside. Do not allow caliper to hang from brake hose.

5. Remove wheel bearing outer locknut, lock ring and wheel bearing inner adjusting nut.

6. Remove hub and disc assembly, and outer wheel bearing.

7. Remove oil seal, inner wheel bearing and inner and outer bearing cups using a suitable drift.

8. Reverse procedure to install. Adjust wheel bearings as outlined under ``Wheel Bearings, Adjust'' procedure.

Wheel Fastener: Technical Service Bulletins Wheels - Locking Wheel Nuts Impact On Tire Balance

85-37 3E (X) FEB., 1985 Subject:

LOCKING WHEEL NUTS

Model and Year: ALL

TO: ALL CHEVROLET DEALERS

Whenever a heavier, solid locking wheel nut is used to replace a standard nut, it should be installed nearest the valve stem, and a 1/2 ounce balance weight should be added 180~ opposite the locking nut.

This situation will usually occur on styled wheels. For improved appearance, the balance weight should be installed on the wheel's inboard side.

When rotating tires, always re-install the locking nut nearest the tire valve stem so that it remains opposite the 1/2 ounce balance weight.

This procedure will improve the on-car wheel balance by compensating for the heavy locking wheel nut. This does not apply to the light weight, two-piece locking nuts used on some Chevrolet models.

Wheel Fastener: Specifications Fastener Tightening Specifications

1992 S Series Pickups.....95 ft/lbs

1992 Safari.....100 ft/lbs

1992 M Van.....100 ft/lbs

1992 S Series Jimmy.....95 ft/lbs

1992 S Series Sonoma.....95 ft/lbs

1991-92 C-, K10-20.....120 ft/lbs

1991-92 C-, K30:

Single Rear Wheel.....120 ft/lbs Dual Rear Wheels (8 lug).....140 ft/lbs Dual Rear Wheels (10 lug).....175 ft/lbs

1991-92 R-, V30:

Single Rear Wheel.....120 ft/lbs Dual Rear Wheels (8 lug).....140 ft/lbs Dual Rear Wheels (10 lug).....175 ft/lbs

1990-92 Lumina APV.....100 ft/lbs

1989-92 Van:

G10-25.....100 ft/lbs G30-35 Single Rear Wheel.....120 ft/lbs G30-35 Dual Rear Wheels.....140 ft/lbs

1991 R-, V10.....100 ft/lbs

1991 R-, V20.....120 ft/lbs

1990-91 S Series:

2WD.....80 ft/lbs 4WD.....100 ft/lbs

1990 C-, K-, Pickup.....
.....105 ft/lbs

1990 C-, K-, Sierra.....
.....105 ft/lbs

1990 C-, K-35 W/Dual Rear Wheels.....
.....125 ft/lbs

1990 R-, V-Pickup:

Single Rear Wheel.....
.....120 ft/lbs Dual Rear Wheels.....
.....140 ft/lbs

1989 Pickups:

Single Rear Wheel.....
.....120 ft/lbs Dual Rear Wheels.....
.....140 ft/lbs

1989 Sierra:

Single Rear Wheel.....
.....120 ft/lbs Dual Rear Wheels.....
.....140 ft/lbs

1989 Safari.....
.....102 ft/lbs

1988-89 S Series:

With Aluminum Wheels.....
.....90 ft/lbs Without Aluminum Wheels.....
.....73 ft/lbs

1988 R-, V-Pickup:

Single Rear Wheels.....
.....103 ft/lbs Dual Rear Wheels.....
.....140 ft/lbs

1988 C-, K10-15:

Single Rear Wheel.....
.....90 ft/lbs Dual Rear Wheels.....
.....125 ft/lbs

1988 Sierra:

Single Rear Wheel.....
.....90 ft/lbs Dual Rear Wheels.....
.....125 ft/lbs

1988 Astro.....
.....102 ft/lbs

1988 Safari.....
.....102 ft/lbs

1988 Van G10-25.....102 ft/lbs

1988 Van G30-35:

5 bolts.....117 ft/lbs 8 bolts.....139 ft/lbs

1987-88 R-, V-Blazer:

2WD.....103 ft/lbs 4WD With Aluminum Wheels, 6 lug.....103 ft/lbs 4WD Without Aluminum Wheels, 6 lug.....88 ft/lbs

1987-88 R-, V-Jimmy:

2WD.....103 ft/lbs 4WD With Aluminum Wheels, 6 lug.....103 ft/lbs

4WD Without Aluminum Whells, 6 lug.....88 ft/lbs

1987-88 R-, V-Suburban:

2WD.....103 ft/lbs 4WD With Aluminum Wheels, 6 lug.....103 ft/lbs 4WD Without Aluminum Whells, 6 lug.....88 ft/lbs

1987 R-, V-Pickup:

2WD.....88 ft/lbs 4WD.....80 ft/lbs

1987 Van:

G10-25.....88 ft/lbs G30-35, exc. 8 lug.....103 ft/lbs G30-35, with 8 lug.....125 ft/lbs

1986-87 S-10,15.....90 ft/lbs

1984-86 C-K Models (Blazer, Jimmy, Suburban):

5 lug (1/2").....100 ft/lbs 5 lug (9/16").....120 ft/lbs 6 lug.....90 ft/lbs 8 lug.....140 ft/lbs

1984-86 Van:

G10-25.....100 ft/lbs G30-35 (5 lug).....120 ft/lbs G30-35 (Dual Rear Wheels, 8 lug).....140 ft/lbs

1983-85 S-10, 15:

With Standard Wheels.....81 ft/lbs With Optional Wheels.....100 ft/lbs

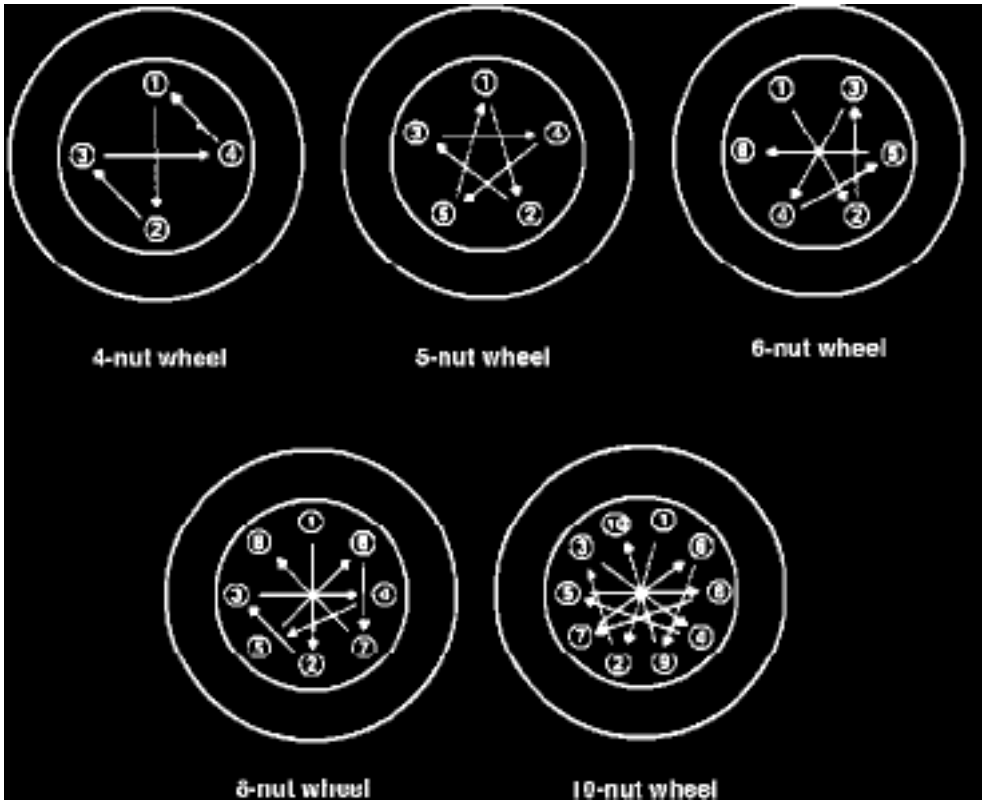
1983 C-K Models (Blazer, Jimmy, Suburban):

5 lug.....100 ft/lbs 6 lug.....90 ft/lbs 8 lug.....

.....120 ft/lbs

1983 Van:

G10-25.....100 ft/lbs G30-35 (Single Rear Wheel).....120 ft/lbs G30-35 (Dual Rear Wheels).....140 ft/lbs



Wheel Fastener: Specifications Wheel Fastener Tightening Sequence

Lug Nut Torque Patterns

IMPORTANT

Check all parts, including rims, lug studs, lug nuts, and mating surfaces of hubs and tire rims for rust, damage, or dirt. Clean mating surfaces with a wire brush to remove any foreign material. Replace any damaged parts as needed. Careless installation of tire/rim assemblies in a vehicle is a major cause of tire installation problems. Proper installation, including fastener torque, is essential to economical, safe and trouble free service. Use only the proper sizes and types of fasteners for safe and proper service. Tighten the fasteners a quarter turn at a time using the tightening sequence diagram as a guide. This is very important to prevent misalignment of the wheel. Continue tightening the fasteners in sequence until the fasteners are tightened to the proper torque (See WHEEL FASTENER TORQUE).

CAUTION: Improper torque or tightening sequence can cause distortion, fatigue cracks, or alignment problems. After driving the vehicle for a short distance, recheck the wheel fastener torque. Parts will usually seat naturally, reducing the torque on the fasteners. Retorque all fasteners to the proper torque.

Wheel Seal: Service and Repair

1. Remove axle shaft as previously described.

2. Use a suitable puller to remove bearing and oil seal.

3. Lubricate wheel bearing and cavity between seal lips with wheel bearing lubricant before installation.

4. Reverse procedure to install.

Compression Check: Specifications

Minimum, 698 kPa (100 psi) @ 200 rpm. The lowest cylinder reading should not be less than 80% of the highest. Perform compression test with engine at normal operating temperature, spark plugs removed and throttle wide open.

Camshaft: Service and Repair

V6-229, 262, V8-267, 305, 350, 400 & 454 Depending on vehicle and engine application, the grille, radiator and condenser (if equipped) must be removed to facilitate camshaft removal.

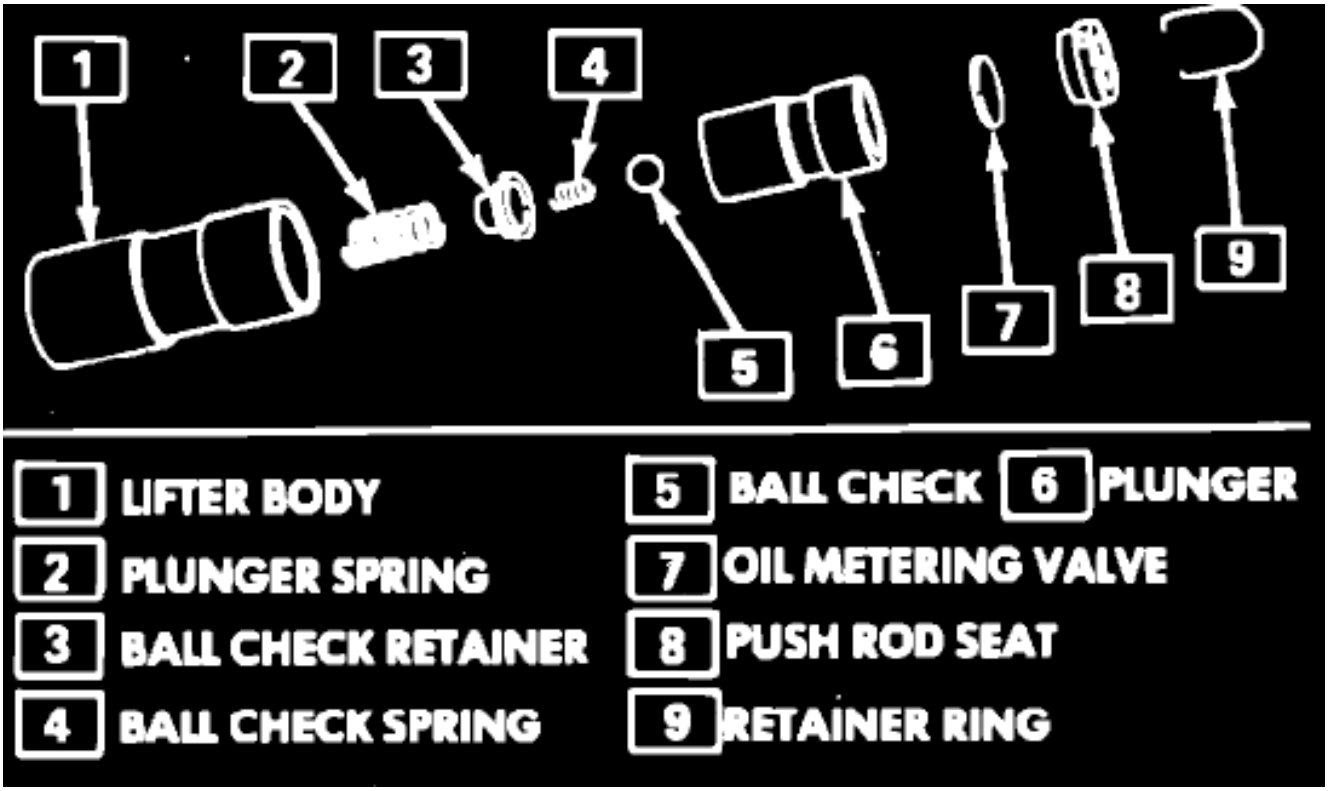
1. Remove intake manifold as outlined previously.

2. Remove pushrods and valve lifters.

3. Remove timing case cover and timing chain as outlined previously.

4. Install two 5/16-18 x 4 inch bolts into camshaft bolt holes, then pull camshaft out of cylinder block.

5. Reverse procedure to install.



Lifter / Lash Adjuster: Service and Repair

Fig. 26 Hydraulic valve lifter (Typical)

The hydraulic valve lifters, Fig. 26, are simple in design. Readjustments are not necessary and servicing them requires that care and cleanliness be exercised in the handling of parts.

DISASSEMBLE & ASSEMBLE

1. Hold plunger down with pushrod and, using a small screw driver or awl, remove plunger retainer.

2. Remove parts from lifter body.

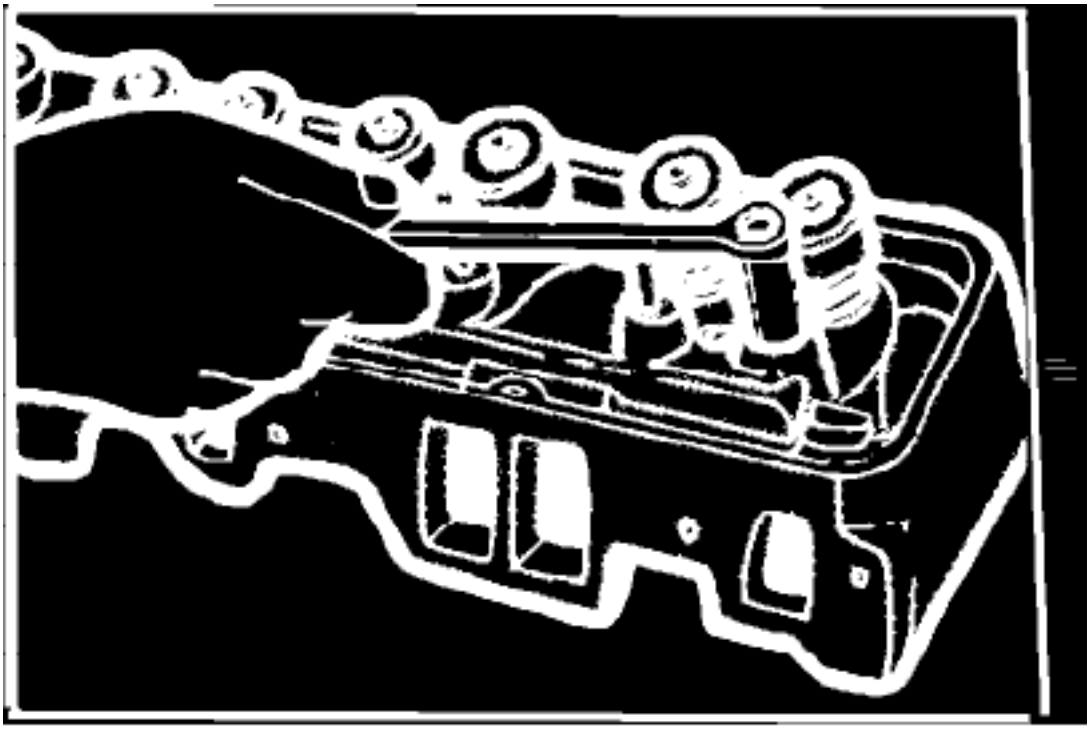
3. Clean all parts and inspect for damage. If any parts are damaged, the entire lifter assembly should be replaced. The inertia valve in the plunger for rocker arm lubrication should move when the plunger is shaken.

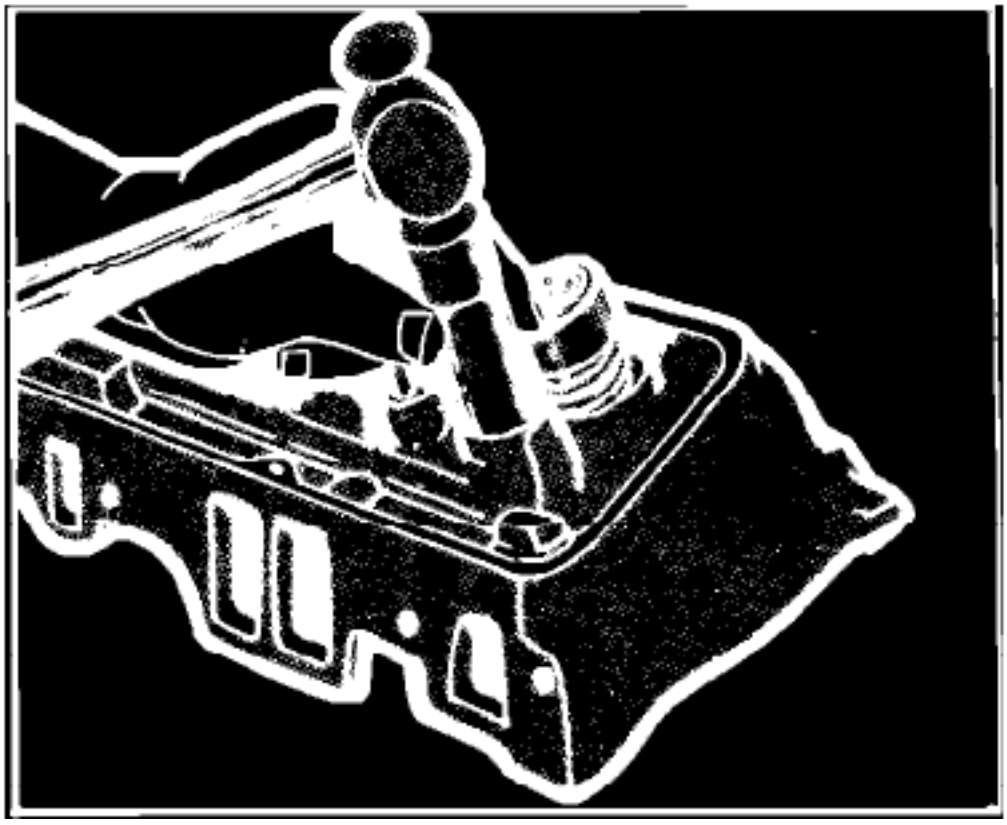
4. To reassemble, invert plunger and set ball into hole in plunger. Place ball check valve retainer over ball and on plunger. Place check valve retainer spring over retainer. Assemble body over plunger assembly. Turn assembly over and install pushrod seat. Compress plunger with pushrod and install retainer.

5. Compress plunger to open oil holes and fill plunger with engine oil. Work plunger up and down and refill.

Push Rod: Application and ID

When a replacement pushrod has a paint stripe at one end, this painted end must be installed in contact with the rocker arm. To provide durability a hardened insert is incorporated in the rocker arm end of these pushrods.





Rocker Arm Assembly: Service and Repair

Fig. 24 Rocker arm stud removal. Exc. V6-231 & V8-454

Fig. 25 Rocker arm stud installation. Exc. V6-231 & V8-454

EXC. V6-231 Rocker arm studs that have damaged threads may be replaced with standard studs. Loose studs should be replaced with .003 inch or .013 inch oversize studs which are available for replacement. Remove the old stud by placing a suitable spacer over the stud, Fig. 24. Install a nut and flat washer on the stud and pull out the stud by turning the nut. After reaming the hole for an oversize stud, coat the press-fit area of the new stud with rear axle lubricant. Install the stud by driving it in until it protrudes from the head the same distance as the other studs, Fig. 25. On V8-454, the rocker arm studs are threaded into the cylinder head. Coat threads on cylinder head end of stud before assembling to head.

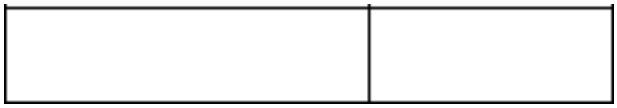
Connecting Rod Bearing: Service and Repair

6-250, 292, V6-229, 262, V8-267, 305, 350, 400 & 454 Connecting rod bearing inserts are available in standard size and undersizes of .001 inch, .002 inch, .010 inch and .020 inch. The bearings can be replaced without removing the rod assembly by removing the cap and replacing the upper and lower halves of the bearing.

Connecting Rod: Specifications Bearing Clearance

Bearing Clearance

Rod Bearing Clearance .0013-.0035 in



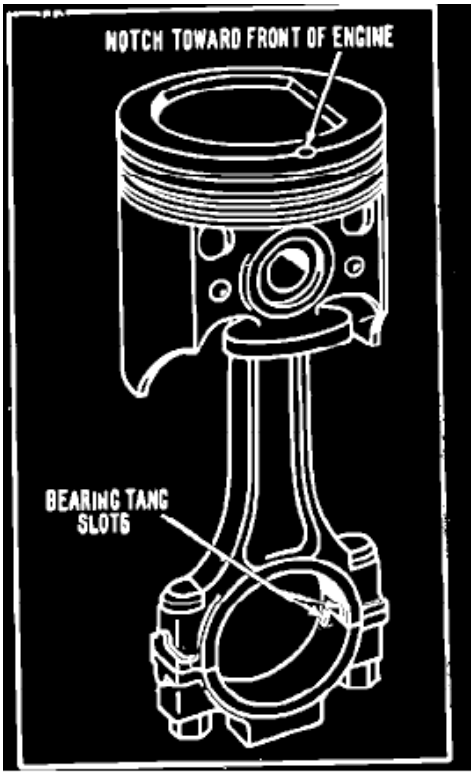
Connecting Rod: Specifications Large End Side Clearance

Large End Side Clearance

Rod Side Clearance .006-.014 in

Connecting Rod: Specifications

Connecting Rod Cap Bolts 45 ft.lb


NOTCH TOWARD FRONT OF ENGINE
BEARING TANG SLOTS

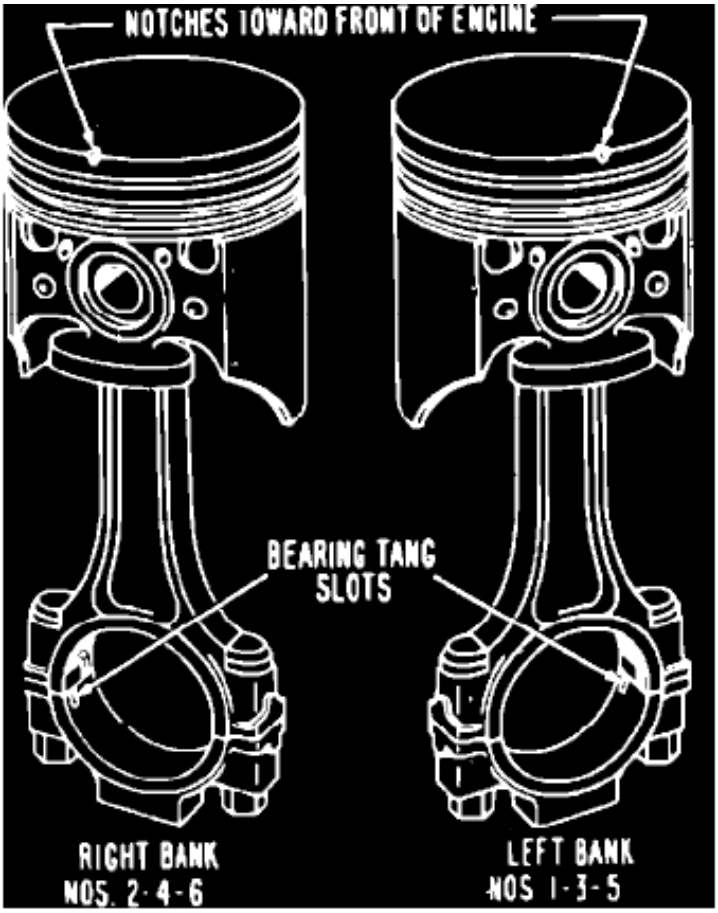
NOTCH TOWARD FRONT OF ENGINE
BEARING TANG SLOTS

Connecting Rod: Service and Repair

Assemble pistons to connecting rods as shown in Figs. 36 through 41.

Fig. 36 Piston & rod assembly. 6-250

Fig. 37 Piston & rod assembly. 6-292


NOTCHES TOWARD FRONT OF ENGINE
BEARING TANG SLOTS
RIGHT BANK NOS. 2-4-6
LEFT BANK NOS 1-3-5

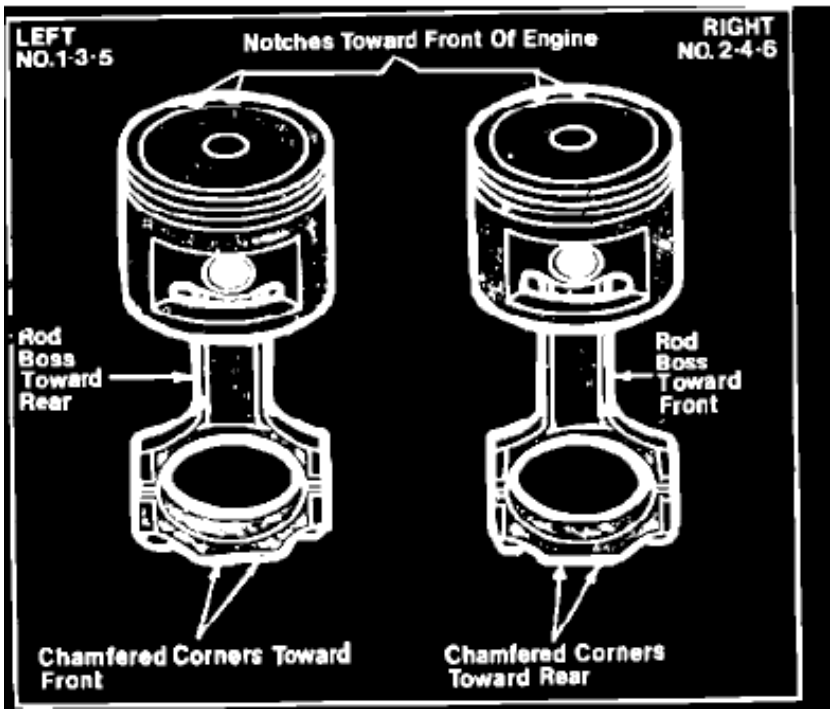
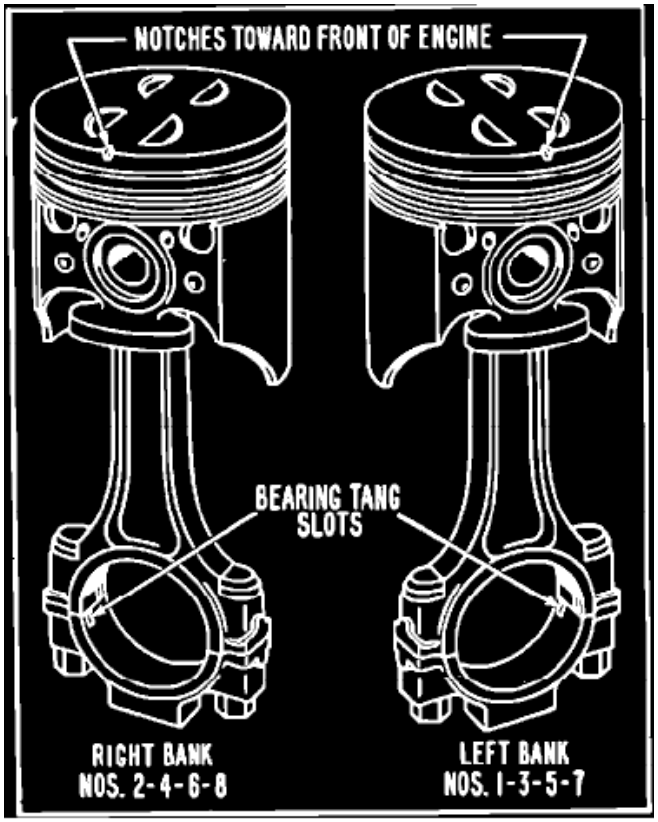

LEFT NO.1-3-5
Notches Toward Front Of Engine
RIGHT NO. 2-4-6
Rod Boss Toward Rear
Rod Boss Toward Front
Chamfered Corners Toward Front
Chamfered Corners Toward Rear

Fig. 38 Piston & rod assembly. V6-229 & 262

Fig. 39 Piston & rod assembly. V6-231


NOTCHES TOWARD FRONT OF ENGINE
BEARING TANG SLOTS
RIGHT BANK NOS. 2-4-6-8
LEFT BANK NOS. 1-3-5-7

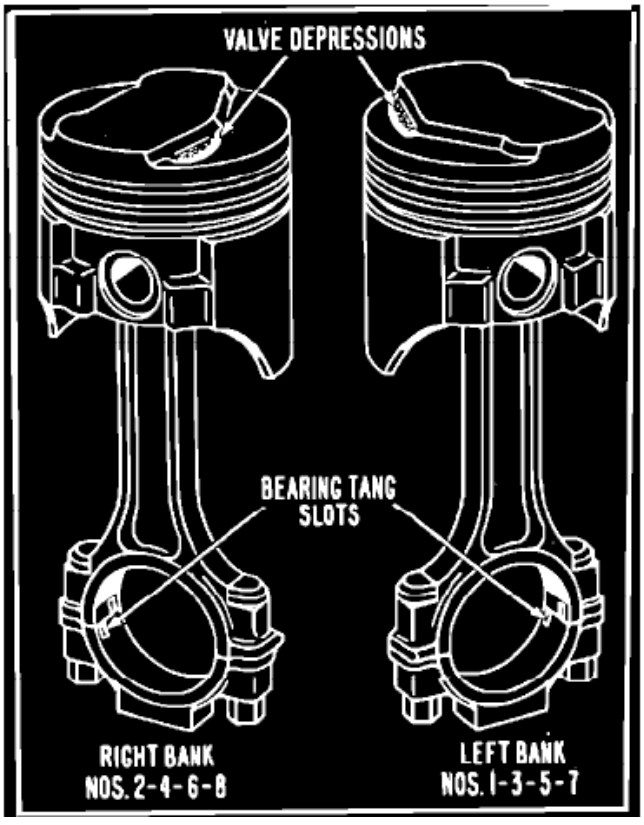

VALVE DEPRESSIONS
BEARING TANG SLOTS
RIGHT BANK NOS. 2-4-6-8
LEFT BANK NOS. 1-3-5-7

Fig. 40 Piston & rod assembly. V8-267, 305, 350 & 400

Fig. 41 Piston & rod assembly. V8-454

Crankshaft Main Bearing: Service and Repair

V6-229, 262, V8-267, 305, 350, 400 & 454 Shell type bearings are used, and if worn excessively, should be replaced. No attempt should be made to shim, file or otherwise take up worn bearings. Main bearings are available in standard and undersizes of .001, .002, .009, .010 and .020 inch.

Crankshaft: Specifications Main Cap Torque

Main Cap Torque

Main Bearing Cap Bolts 70 ft.lb

Crankshaft: Specifications Journal/Bearing Dimensions

Journal/Bearing Dimensions

Crankshaft Journals Main Bearing Journal Diameter Note: Front, 2.4484-2.4493 inches; intermediate,

2.4481-2.4490 inches; rear,2.4479-2.4488 inches.

Connecting Rod Journal Diameter 2.0986-2.0998 in

Maximum Out Of Round All 0.001 in

Maximum Taper All 0.001 in

Runout Service Limit Note: If main journals are misaligned, crankshaft is bent

and should be replaced.

Bearing Clearance Main Bearings Note: Production: Front, .0008-.0020 inch; intermediate,

.0011-.0023 inch;rear, .0017-.0032 inch. Service: Front,

.001-.0015 inch; intermediate,.001-.0025 inch; rear,

.0025-.0035 inch.

Thrust Bearing .002-.006 in

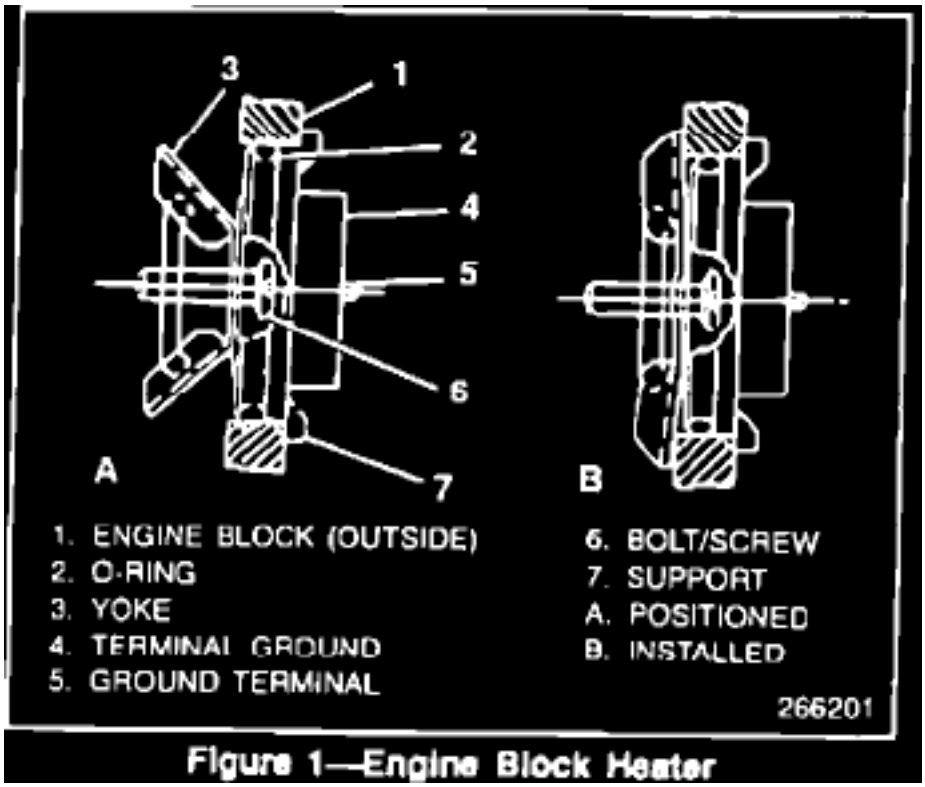


Figure 1—Engine Block Heater

Engine Block Heater: Customer Interest Engine - Block Heater Leaks

Number: 92-159-9E

Section: 9E

Date: APRIL 1992

Corporate Bulletin No.: 266201

ASE No.: A7

Subject: ENGINE BLOCK HEATER LEAKS

Model and Year: 1976-92 LIGHT DUTY TRUCKS

Some owners of 1976-1992 light duty truck engines may experience a leaking condition from the engine block heater. This condition may be caused by the block heater losing torque because the yoke, which secures the block heater, has cracked. This could cause a loss of engine coolant.

The block heater brass yoke may crack due to stress corrosion where it contacts the stainless steel crossbar. The yoke is stressed or cracked from over torquing the hold down screw (Figure 1, "6"). Corrosion in the stressed area is accelerated due to the dissimilar metals.

To correct this condition, a redesigned block heater should be installed. The yoke material (Figure 1 "3") of the block heater was changed from brass to stainless steel. The stainless steel is a higher strength material which reduces the possibility of stress corrosion and galvanic potential.

SERVICE PROCEDURE:

Follow the "ENGINE BLOCK HEATER REPLACEMENT" instructions in section 9E ENGINE BLOCK HEATER of the appropriate Service Manual.

CAUTION: The gasket "O" ring seals between the block heater and the block. Excessive tightening is not necessary. The torque specification is 1.6 - 2.2 N-m (15.0 - 20.0 lbs.in.)

The revised engine block heater (P/N 10154624) can be used in any light duty truck, gas or diesel engine, where an engine block heater is used.

SERVICE PARTS INFORMATION

PART NUMBER DESCRIPTION Qty/Veh

10154624 Engine Block Heater 1

Parts are currently available from GMSPO.

WARRANTY INFORMATION

For vehicles repaired under warranty use:

Description Labor Op.

Heater, Engine Block - Replace R4600

Use applicable labor time guide for labor hours.

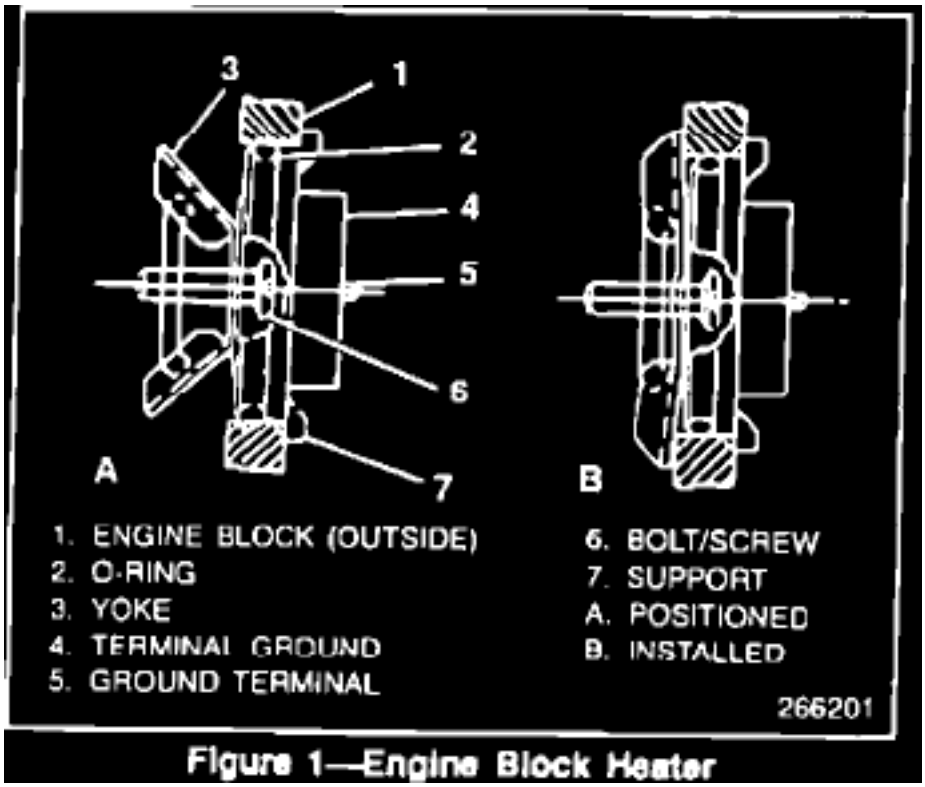


Figure 1—Engine Block Heater

Engine Block Heater: All Technical Service Bulletins Engine - Block Heater Leaks

Number: 92-159-9E

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For vehicles repaired under warranty use:

Description Labor Op.

Heater, Engine Block - Replace R4600

Use applicable labor time guide for labor hours.

Harmonic Balancer - Crankshaft Pulley: Specifications Balancer Bolt Torque

Balancer Bolt Torque

Vibration Damper Or Pulley 60 ft.lb

Piston: Specifications

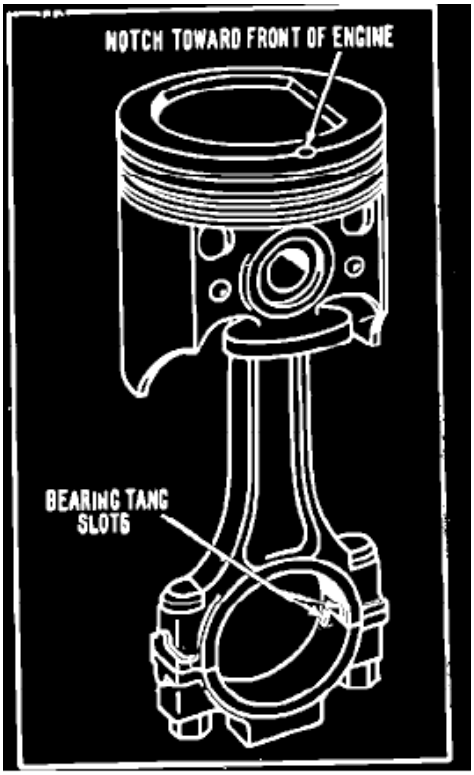
Piston Diameter Standard 3.9988-4.0008 in

Note: Measured at 90 degree angle to piston pin

Piston Clearance 0.0007-0.0017 in

Piston: Service and Repair Piston Measurements and Replacement

EXC. V6-231 A .001 inch oversize piston is available for service use so that proper clearances can be obtained for slightly worn cylinder bores requiring only light honing. In addition, oversizes of .020 inch, .030 inch and .040 inch are available. If the cylinders have less than .005 inch taper or wear, they can be reconditioned with a hone and fitted with the .001 inch oversize piston.


NOTCH TOWARD FRONT OF ENGINE
BEARING TANG SLOTS

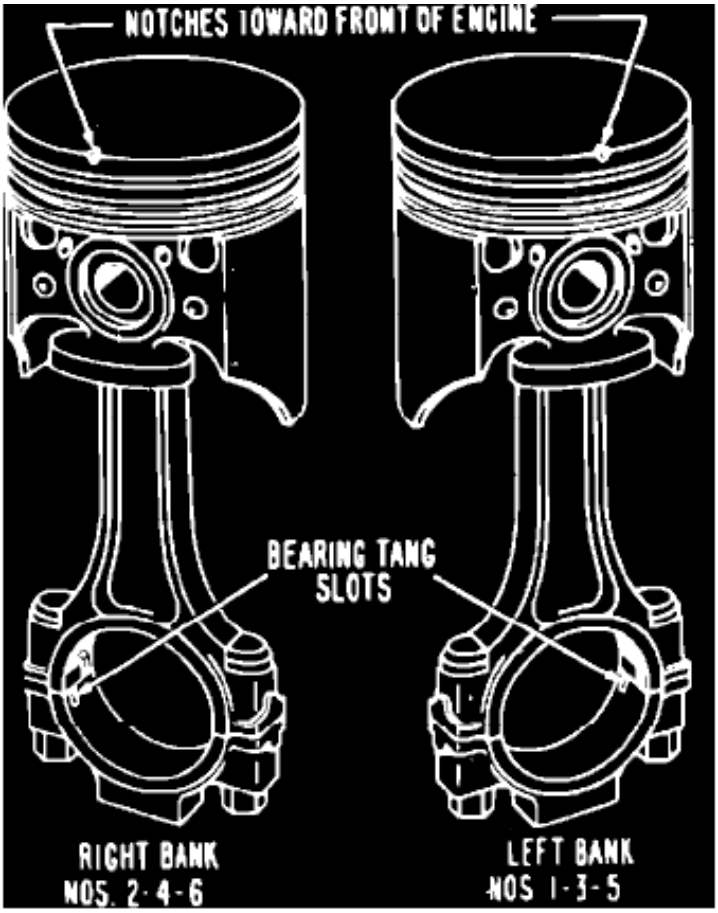
NOTCH TOWARD FRONT OF ENGINE
BEARING TANG SLOTS

Piston: Service and Repair Pistons & Rods Assemble

Assemble pistons to connecting rods as shown in Figs. 36 through 41.

Fig. 36 Piston & rod assembly. 6-250

Fig. 37 Piston & rod assembly. 6-292


NOTCHES TOWARD FRONT OF ENGINE
BEARING TANG SLOTS
RIGHT BANK NOS. 2-4-6
LEFT BANK NOS 1-3-5

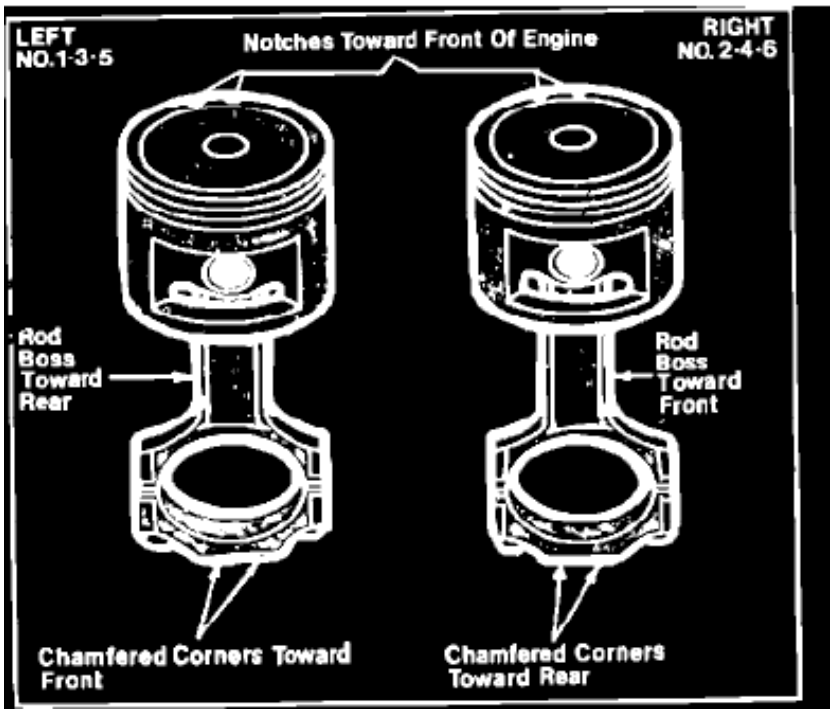
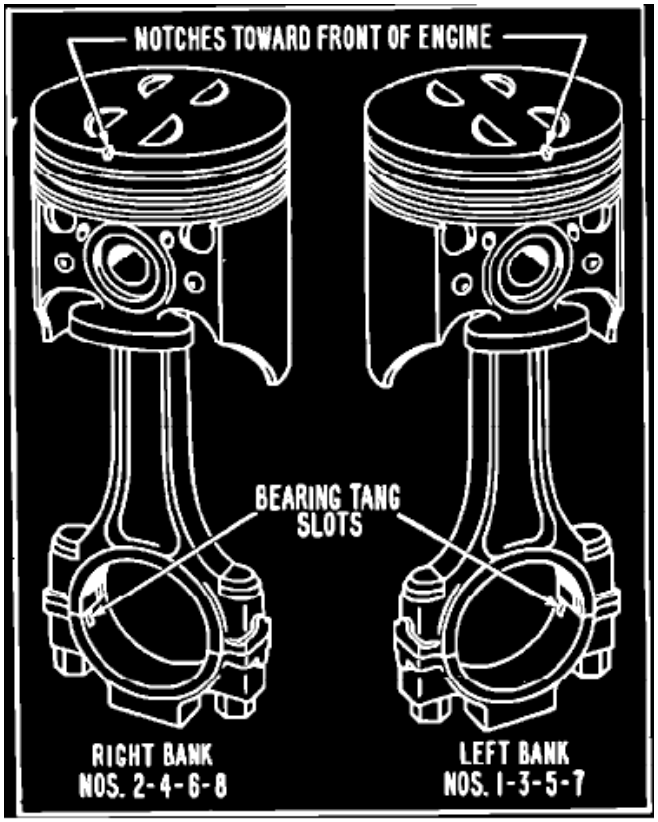

LEFT NO.1-3-5
Notches Toward Front Of Engine
RIGHT NO. 2-4-6
Rod Boss Toward Rear
Rod Boss Toward Front
Chamfered Corners Toward Front
Chamfered Corners Toward Rear

Fig. 38 Piston & rod assembly. V6-229 & 262

Fig. 39 Piston & rod assembly. V6-231


NOTCHES TOWARD FRONT OF ENGINE
BEARING TANG SLOTS
RIGHT BANK NOS. 2-4-6-8
LEFT BANK NOS. 1-3-5-7

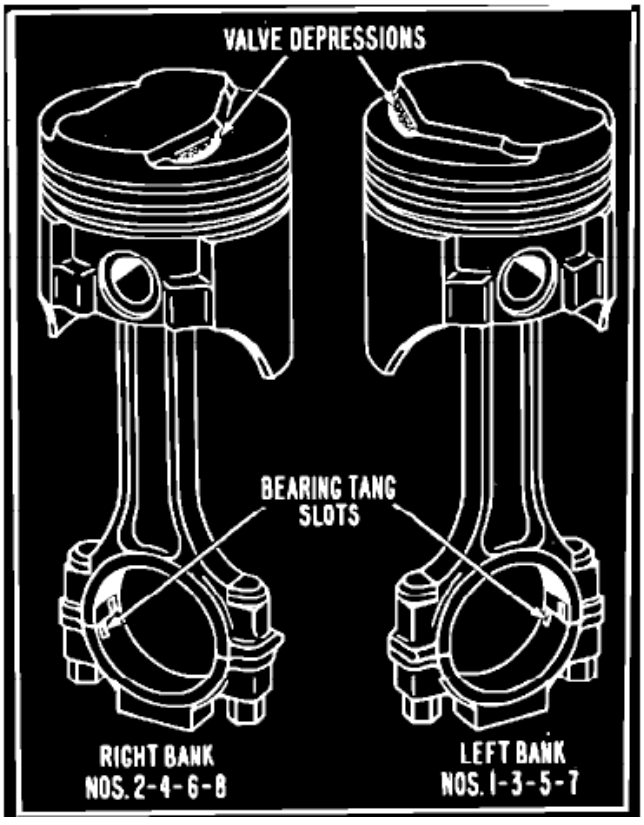

VALVE DEPRESSIONS
BEARING TANG SLOTS
RIGHT BANK NOS. 2-4-6-8
LEFT BANK NOS. 1-3-5-7

Fig. 40 Piston & rod assembly. V8-267, 305, 350 & 400

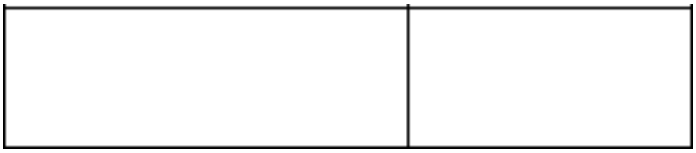
Fig. 41 Piston & rod assembly. V8-454

Piston Pin: Specifications

Piston Pin Diameter Standard 0.9269-0.9271 in

Pin To Piston Bore Clearance 0.001 in

Note: Maximum



Piston Pin: Specifications Pin Interference Fit

Pin Interference Fit

Pin To Bore Clearance .0008-.0016 in

Note: Interference fit.

Piston Ring: Specifications

End Gap Compression 0.01 in

Note: Minimum

Oil 0.015 in

Side Clearance Compression 0.0012-0.0032 in

Oil 0.002-0.007 in

Valve Clearance: Specifications

FRONT TO REAR 6-250, 292.....
.....E-I-I-E-E-I-I-E-E-I-I-E V6-231.....
.....
.....E-I-I-E-I-E V6-262 Left Side.....
.....E-I-E-I-I-E Right Side.....
.....
.....E-I-I-E-I-E V8-267, 305, 350, 400.....
.....E-I-I-E-E-I-I-E V8-454....
.....
.....E-I-E-I-E-I-E-I

Valve Clearance: Adjustments

STATIC ADJUSTMENT

NOTE: This procedure does not apply to 231 V-6 engines.

1. Start engine and allow to reach normal operating temperature, then shut engine off.

2. With engine in position to fire No. 1 cylinder, adjust the following valves: V6-229 and 262, Exhaust Nos. 1, 5 and 6; Intake Nos. 1, 2 and 3. 6-250 and 292, Exhaust Nos. 1, 3 and 5; Intake Nos. 1, 2 and 4. V8 engines, Exhaust Nos. 1, 3, 4 and 8; Intake Nos. 1, 2, 5 and 7. To properly adjust valves, tighten adjusting nut until all lash is eliminated, then tighten nut the specified additional number of turns. On V8-454 / 7.4L engine, tighten nut 3/4 additional turn from zero lash. On all others, tighten nut one full turn from zero lash.

3. Turn crankshaft one complete revolution, which will bring engine in position to fire cylinders 4(V6) or 6(Inline 6 and V8). With engine in this position, adjust the following valves: V6-229 and 262, Exhaust Nos. 2, 3 and 4; Intake Nos. 4, 5 and 6. 6-250 and 292, Exhaust Nos. 2, 4 and 6; Intake Nos. 3, 5 and 6. V8 engines, Exhaust Nos. 2, 5, 6 and 7; Intake Nos. 3, 4, 6 and 8. When zero lash is obtained, tighten adjusting nuts as specified in step 2.

ENGINE RUNNING ADJUSTMENT

NOTE: The following procedure, performed with the engine running, should be done only in case readjustment is required.

1. After engine has been warmed to operating temperature, remove valve cover and install a new valve cover gasket.

2. With engine running at idle speed, back off valve rocker arm nut until rocker arm starts to clatter.

3. Turn rocker arm nut down slowly until the clatter just stops. This is the zero lash position.

4. Turn nut down 1/4 additional turn and pause 10 seconds until engine runs smoothly. Repeat additional 1/4 turns, pausing 10 seconds each time, until nut has been turned down the specified number of turns from the zero lash position. This preload adjustment must be done slowly to allow the lifter to adjust itself to prevent the possibility of interference between the intake valve head and top of piston, which might result in internal damage and/or bent pushrods. Noisy lifters should be replaced.

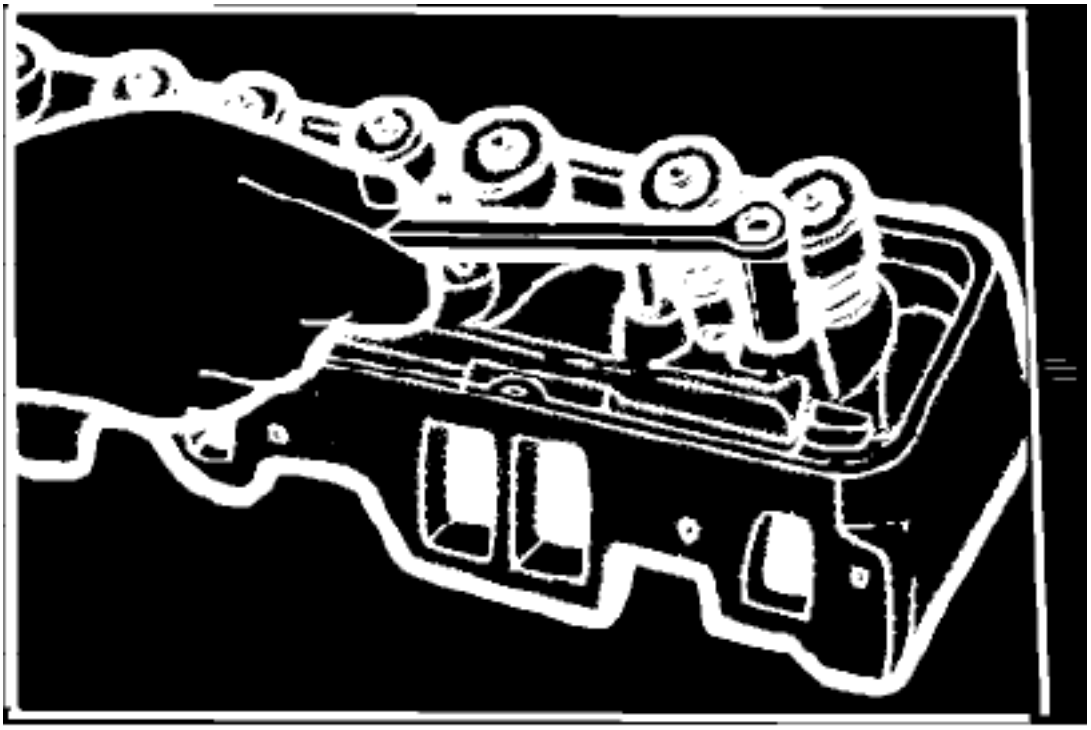
Fuel Pressure Release: Service and Repair

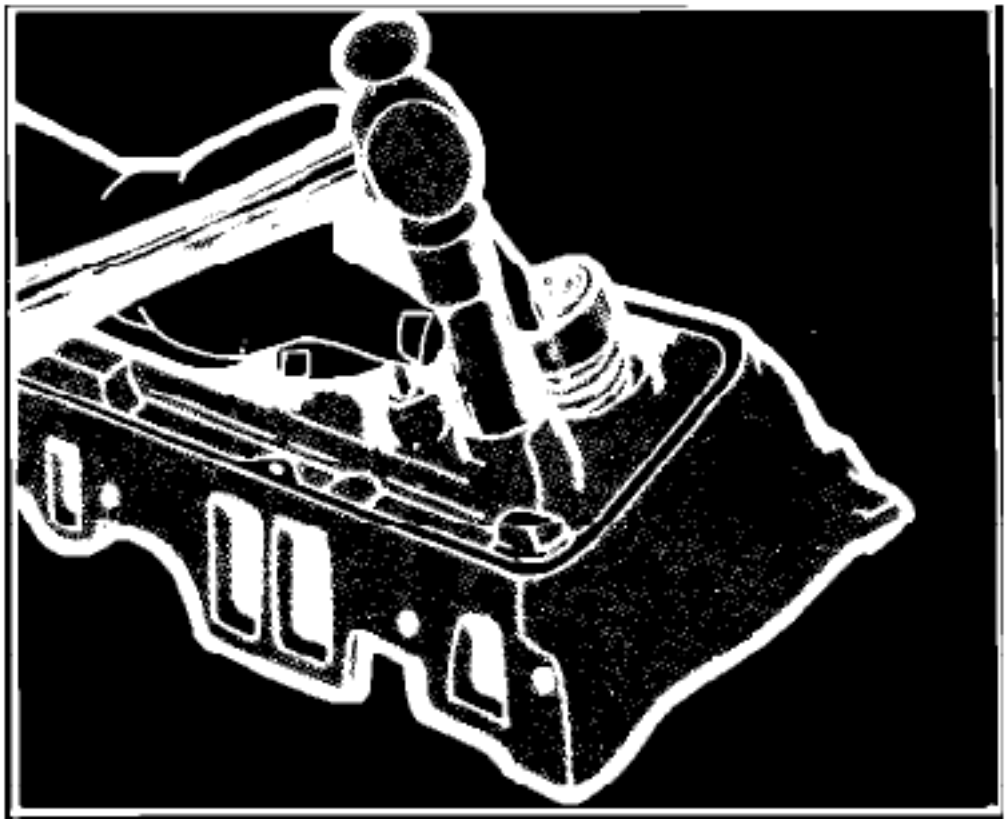
Throttle Body Injected Engines

1. Remove fuel pump fuse from fuse box. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and replace fuel pump fuse.

Port Injected Engines

1. Disconnect fuel tank harness connector. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and reconnect fuel tank harness connector.





Rocker Arm Assembly: Service and Repair

Fig. 24 Rocker arm stud removal. Exc. V6-231 & V8-454

Fig. 25 Rocker arm stud installation. Exc. V6-231 & V8-454

EXC. V6-231 Rocker arm studs that have damaged threads may be replaced with standard studs. Loose studs should be replaced with .003 inch or .013 inch oversize studs which are available for replacement. Remove the old stud by placing a suitable spacer over the stud, Fig. 24. Install a nut and flat washer on the stud and pull out the stud by turning the nut. After reaming the hole for an oversize stud, coat the press-fit area of the new stud with rear axle lubricant. Install the stud by driving it in until it protrudes from the head the same distance as the other studs, Fig. 25. On V8-454, the rocker arm studs are threaded into the cylinder head. Coat threads on cylinder head end of stud before assembling to head.

Valve Cover: Specifications

Valve Cover Bolts 45 in.lb

Valve Guide: Specifications Guide Diameter

Guide Diameter

Standard Inside Diameter 0.34375 in

Valve Guide: Service and Repair

Valve guides in these engines are an integral part of the head and, therefore, cannot be removed. For service, guide holes can be reamed oversize to accommodate one of several service valves with oversize stems. Check the valve stem clearance of each valve (after cleaning) in its respective valve guide. If the clearance exceeds the service limits of .004 inch on the intake or .005 inch on the exhaust, ream the valve guide to accommodate the next oversize diameter valve stem. Select the reamer for the smallest oversize which will provide a clean straight bore through the valve guide. After reaming, a new seat should be cut into the head to assure perfect seating of the new valve.

Valve Seat: Specifications

Seat Width Intake .031-.062 in

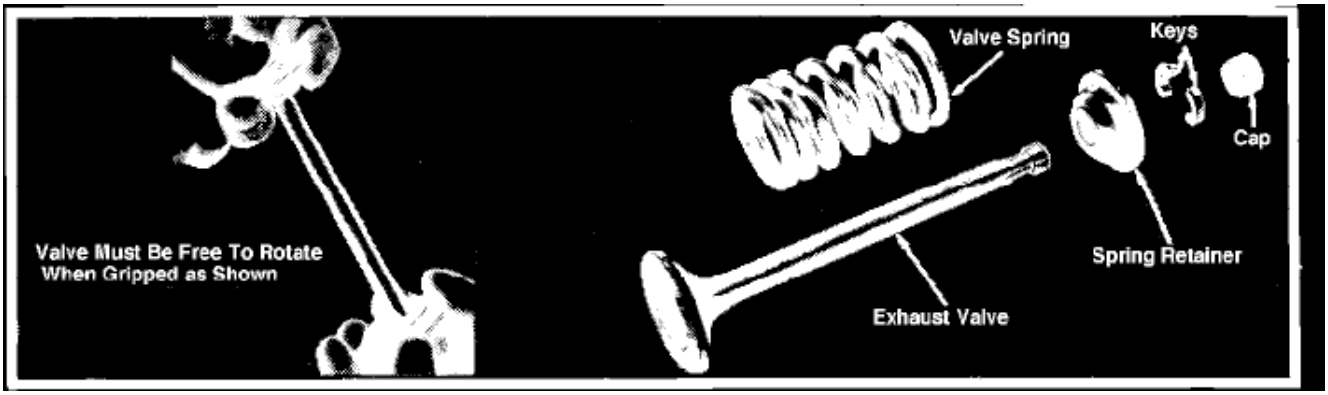
Exhaust .062-.093 in

Seat Angle Intake 46 deg

Exhaust 46 deg

Run Out Intake 0.002 in

Exhaust 0.002 in



Valve Rotator: Service and Repair

Fig. 20 Valve rotator & retaining components

The parts involved in the rotating mechanism, Fig. 20, are a special spring seat retainer, a pair of flat half-moon keys, a close fitting cap located on the valve stem and a specially constructed valve stem. In order to accommodate valve expansion, the valve lash must be maintained. When camshaft rotation causes this lash or clearance to be taken up, the cap on the valve stem causes the valve keys to raise the spring retainer, removing the load on the valve springs from the valve before the valve is moved from its seat. A clearance of .002---.004 inch should be maintained between the end face of the valve stem and cap. This is the distance the spring retainer is moved before the valve is moved. The slow valve rotating motion is caused by the vibration of the valve, the flowing of exhaust gases around the valve head, and a slight rotating motion imparted to the valve by the valve spring. Whenever valve work is being done, a check for clearance should be made by holding the assembled valve and rotating mechanism in the hands. With one hand, press down on the valve cap and turn the valve with the other hand. If the valve turns readily, it indicates that there is clearance present. A special gauge is available to check this clearance. If the gauge indicates no clearance, grind off the end of the valve stem. If the clearance is too great, grind off the open end of the valve cap.

Valve: Specifications Guide Clearance

Guide Clearance

Stem To Guide Clearance Intake Note: Standard, .0010-.0027 inch; service limit, .0037 inch.

Exhaust Note: Standard, .0010-.0027 inch; service limit, .0047 inch.

Valve: Specifications Valve Arrangement

FRONT TO REAR 6-250, 292.....
.....E-I-I-E-E-I-I-E-E-I-I-E V6-231.....
.....
.....E-I-I-E-I-E V6-262 Left Side.....
.....E-I-E-I-I-E Right Side.....
.....
.....E-I-I-E-I-E V8-267, 305, 350, 400.....
.....E-I-I-E-E-I-I-E V8-454....
.....
.....E-I-E-I-E-I-E-I

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Engine, Cooling and Exhaust > Engine > Drive Belts, Mounts, Brackets and Accessories > Drive Belt > Component Information > Technical Service Bulletins > Customer Interest: > 86T204 > Dec > 86 > A/C - Belt Wear, Low Mileage

Drive Belt: Customer Interest A/C - Belt Wear, Low Mileage

CHEVROLET NUMBER: 86-T-204

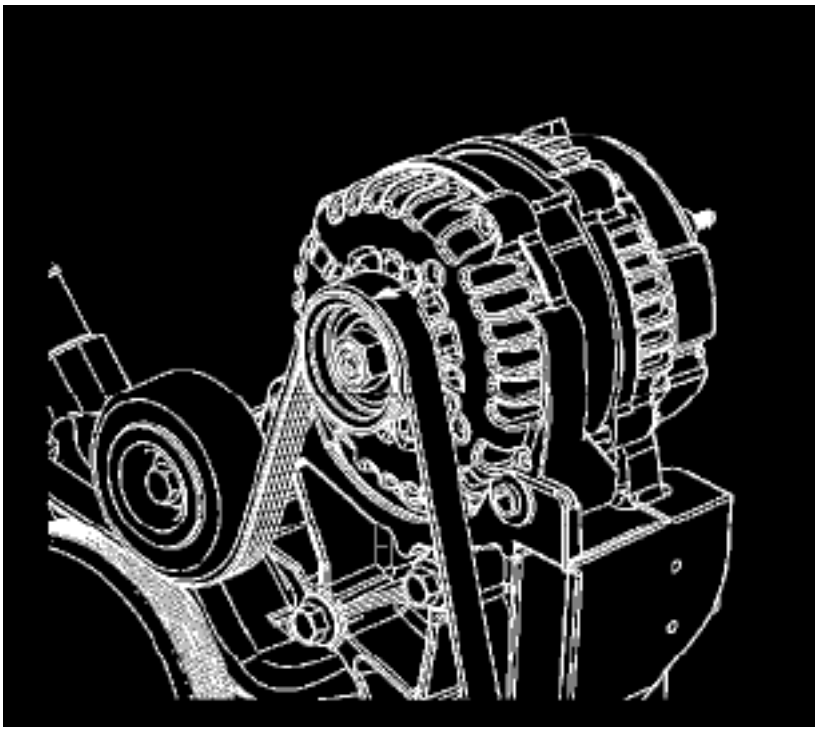
SECTION: 6B - Engine Cooling

DATE: December, 1986

SUBJECT: INCORRECT AIR CONDITIONING COMPRESSOR BELT

MODELS: 1985-86 G VANS EQUIPPED WITH 4.3L (VIN CODE N), 5.0L (VIN CODES H,F), OR 5.7L (VIN CODE L) ENGINE

Some 1985-86 G vans equipped with the 4.3L, 5.0L, or 5.7L engine and air conditioning (A/C) may experience low mileage A/C compressor belt wear. This condition may be caused by an incorrect belt being installed during production of the vehicle. The incorrect A/C belt (3/8" x 55") has a center cordline (CCL) too low in the belt cross section which can cause overloading of the belt. A new A/C belt (3/8" x 54.5" "High Ride") which has a higher CCL has been released for service use. If this condition is encountered, replace the A/C compressor belt with P/N 469594. Tighten belt to 645 N (145 lb.) using belt tension gauge J-23600-B or BT 33-95-ACBN. Refer to the belt replacement procedures in the Light Duty Service Manual, Section 6B, Engine Cooling.



Drive Belt: All Technical Service Bulletins Engine - Drive Belt Misalignment Diagnostics

INFORMATION

Bulletin No.: 08-06-01-008A

Date: July 27, 2009

Subject: Diagnosing Accessory Drive Belt / Serpentine Belt Noise and Availability and Use of Kent-Moore EN-49228 Laser Alignment Tool - Drive Belt

Models:

2010 and Prior GM Passenger Cars and Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 Vehicles 2009 and Prior Saab 9-7X

Supercede: This bulletin is being revised to add a model year and update the Tool Information. Please discard Corporate Bulletin Number 08-06-01-008 (Section 06 - Engine).

Background

Several aftermarket companies offer laser alignment tools for accessory drive systems that can be very helpful in eliminating drive belt noise as a result of misaligned pulleys. Typically pricing ranges from $160 - $200.

EN-49228 Laser Alignment Tool - Drive Belt

The GM Tool program has now made available a competitive, simple to use and time-saving laser tool to assist in achieving precise alignment of the drive belt pulleys. This optional tool removes the guesswork from proper pulley alignment and may serve to reduce comebacks from:

- Drive Belt Noise

- Accelerated Drive Belt Wear

- Drive Belt Slippage

Instructions

The instructions below are specific only to the truck Gen IV V-8 family of engines. These instructions are only for illustrative purposes to show how the tool may be used. Universal instructions are included in the box with the Laser Alignment Tool - Drive Belt.

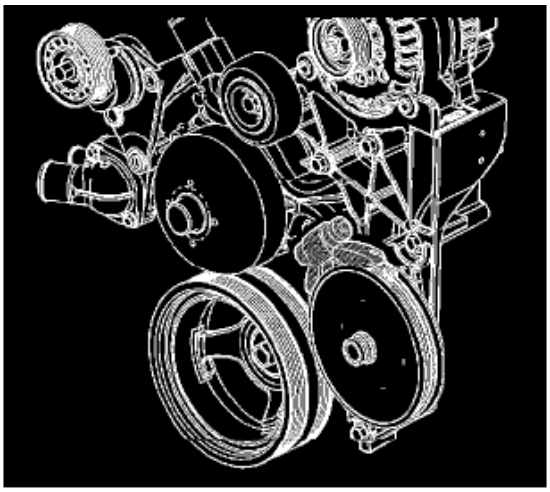
Caution

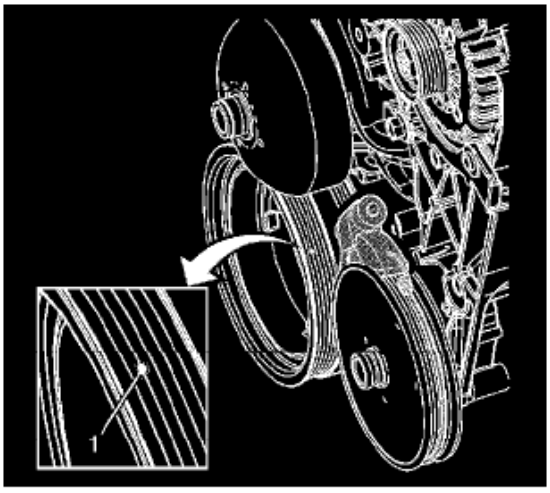
- Do not look directly into the beam projected from the laser.

- Use caution when shining the laser on highly polished or reflective surfaces. Laser safety glasses help reduce laser beam glare in many circumstances.

- Always use laser safety glasses when using the laser. Laser safety glasses are not designed to protect eyes from direct laser exposure.

1. Observe and mark the serpentine belt orientation.





GM Tool Number	Description
EN-49228	Laser Alignment Tool - Drive Belt

2. Remove the serpentine belt from the accessory drive system.

3. Install the tool onto the power steering pulley. Position the legs of the tool into the outer grooves of the pulley, farthest from the front of the

engine.

4. Install the retaining cord around the pulley and to the legs of the tool.

5. Put on the laser safety glasses provided with the tool. 6. Depress the switch on the rear of the tool to activate the light beam. 7. Rotate the power steering pulley as required to project the light beam onto the crankshaft balancer pulley grooves. 8. Inspect for proper power steering pulley alignment.

- If the laser beam projects onto the second rib or raised area (1), the pulleys are aligned properly.

- If the laser beam projects more than one-quarter rib 0.9 mm (0.035 in) mis-alignment, adjust the position of the power steering pulley as required.

- Refer to SI for Power Steering Pulley Removal and Installation procedures.

9. Install the serpentine belt to the accessory drive system in the original orientation.

10. Operate the vehicle and verify that the belt noise concern is no longer present.

Tool Information

Please visit the GM service tool website for pricing information or to place your order for this tool.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Engine, Cooling and Exhaust > Engine > Drive Belts, Mounts, Brackets and Accessories > Drive Belt > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Drive Belt: > 86T204 > Dec > 86 > A/C - Belt Wear, Low Mileage

Drive Belt: All Technical Service Bulletins A/C - Belt Wear, Low Mileage

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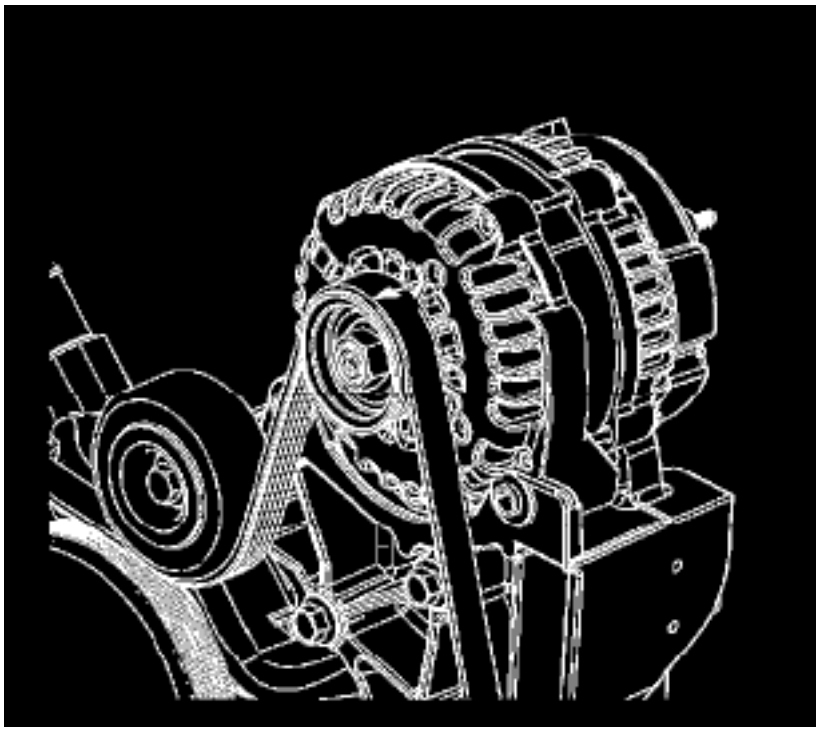

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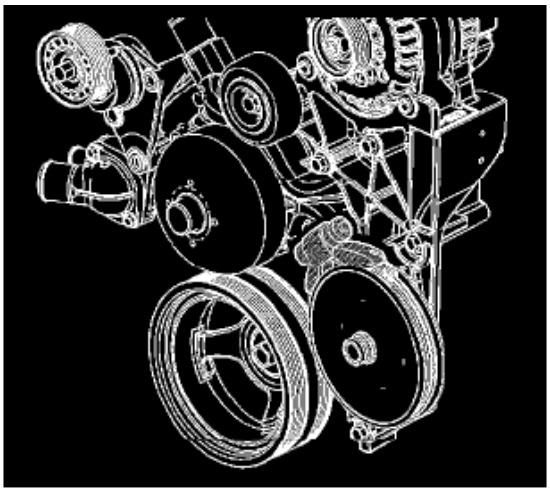

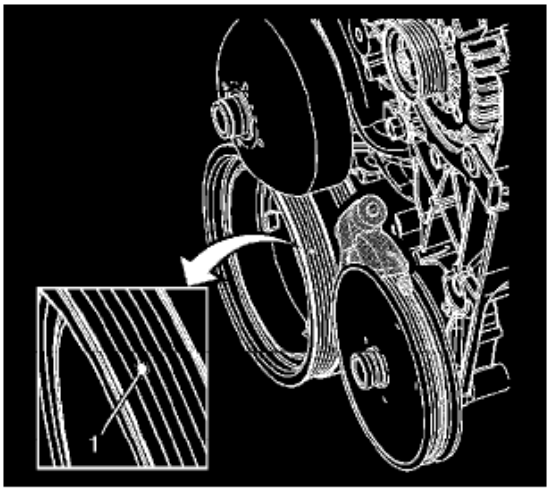

GM Tool Number	Description
EN-49228	Laser Alignment Tool - Drive Belt

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Disclaimer

A belt operated one engine revolution is considered a used belt.

Engine	Year	Alternator	Power Steering	Air Cond.	Air Pump
Strand Tension					
USED BELTS					
5.7L (350) Diesel:					
5/16"	1981	50	50	50	50
3/8"	1981	70	70	70	70
15/32"	1981	90	90	90	90
All Others	1981	70-80	70-80	90-100	70-80
2.8L (173)	1982-86	65-80	65-80	65-80	45
6.2L (379)	1982-86	70-80	70-80	90-100	—
All Others	1982-86	70-80	70-80	90-100	70-80
4.8L (292)	1987-89	90	90	90	90
V6, V8 Gasoline	1987-90	90	67	90	67
V8 Diesel	1987-90	67	67	90	—
All Serpentine	1985-90	*	*	*	—

BELT TENSION

Engine	Year	Alternator	Power Steering	Air Cond.	Air Pump
NEW BELTS					
5.7L (350) Diesel:					
5/16"	1981	80	80	80	80
3/8"	1981	140	140	140	140
15/32"	1981	165	165	165	165
All Others	1981-86	120-130	120-130	135-145	120-130
4.8L (292)	1987-89	169	169	169	169
V6, V8 Gasoline	1987-90	135	146	169	146
V8 Diesel	1987-90	146	146	169	—
All Serpentine	1985-90	*	*	*	—

* Serpentine, automatic tensioner.

BELT TENSION

Engine Mount: Technical Service Bulletins Engine - Rough/Unstable/Incorrect Idle

Number: 88-269-6E

Section: 6E

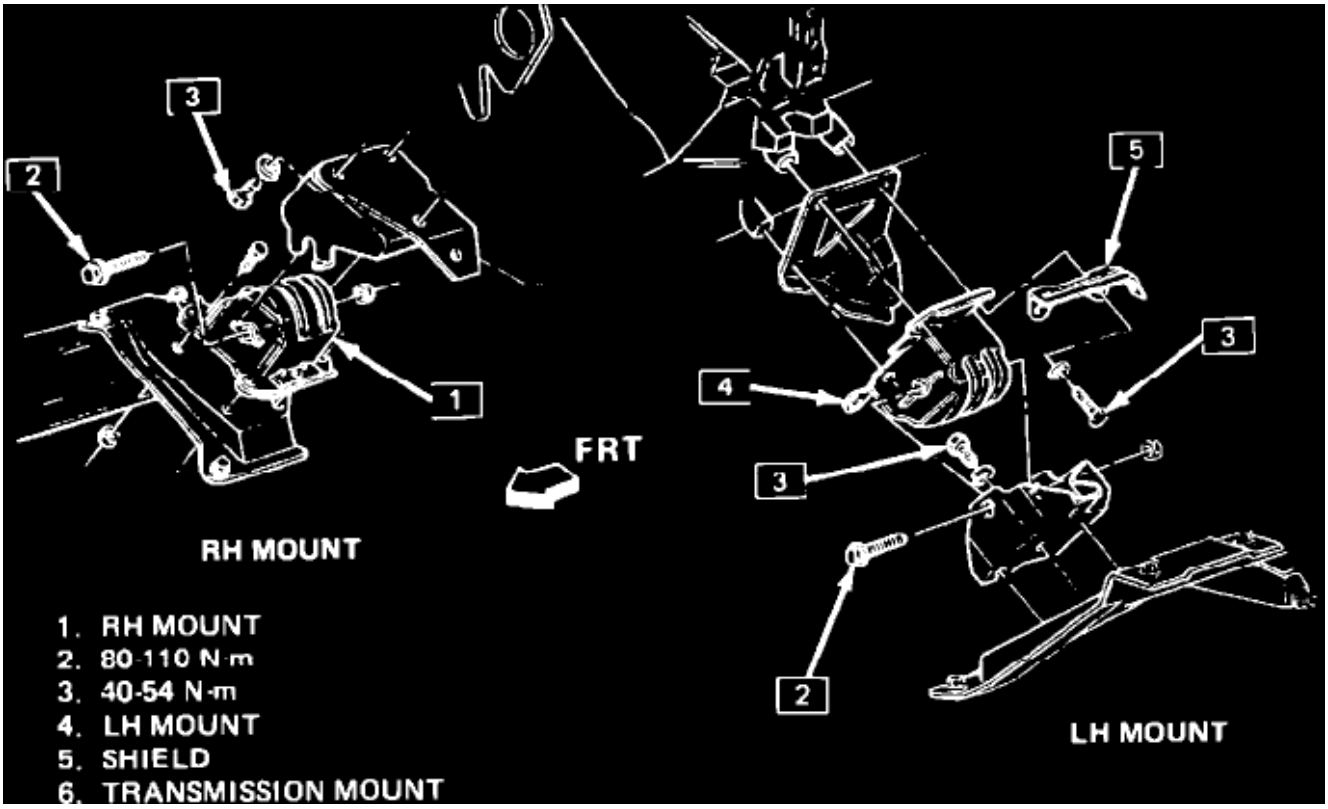
Date: JUNE, 1988

Subject: SERVICE MANUAL UPDATE ROUGH, UNSTABLE OR INCORRECT IDLE

Model and Year: 1981-88 CHEVROLET PASSENGER CARS AND LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

When diagnosing Rough, Unstable, or Incorrect Idle, make sure to check the motor mounts for damage, grounding out on the frame, or mispositioned, etc.



Engine Mount: Service and Repair

CABALLERO & EL CAMINO

Fig. 4 Engine mount replacement. C, K, R & V models w/V6-262 engine

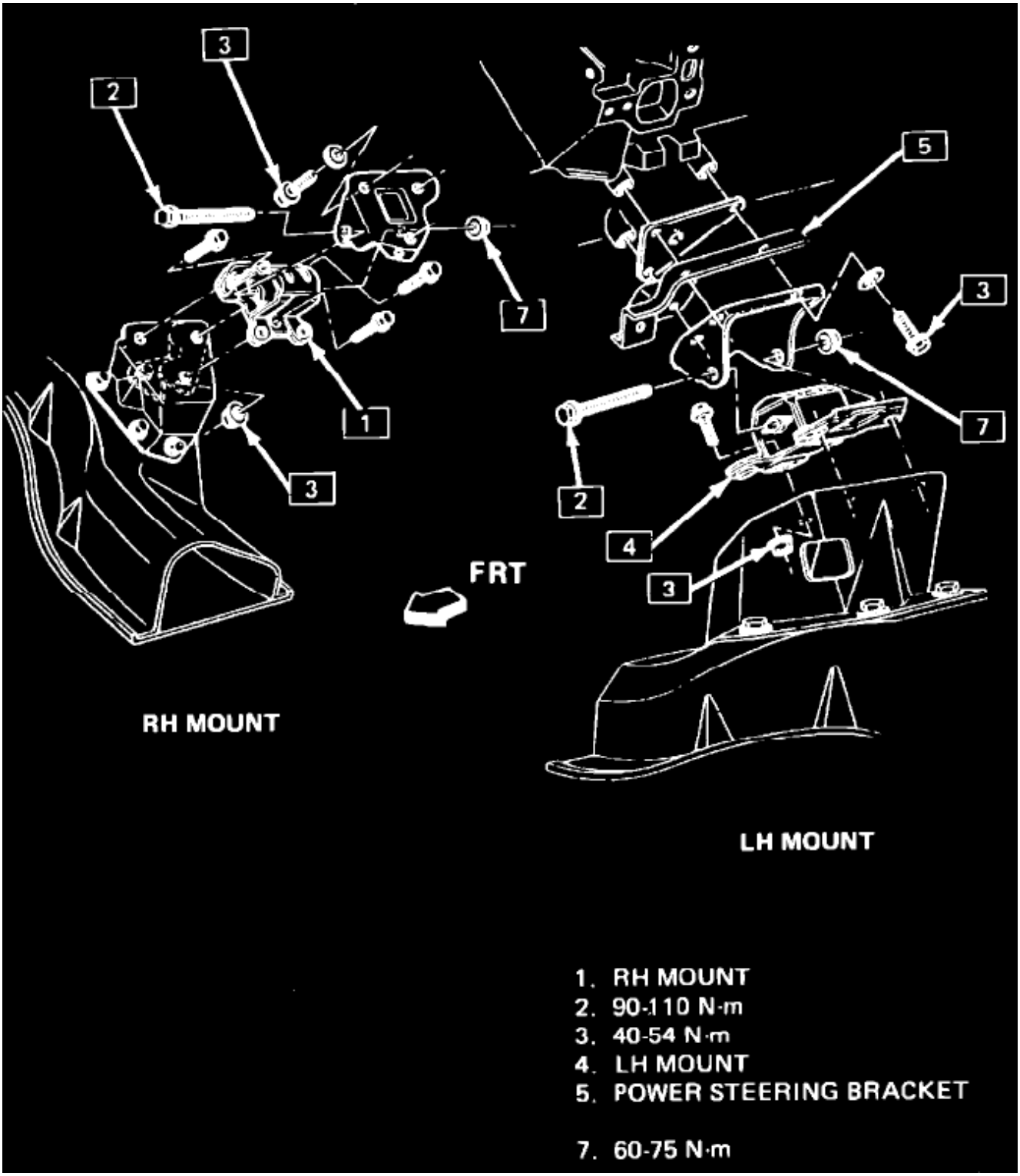
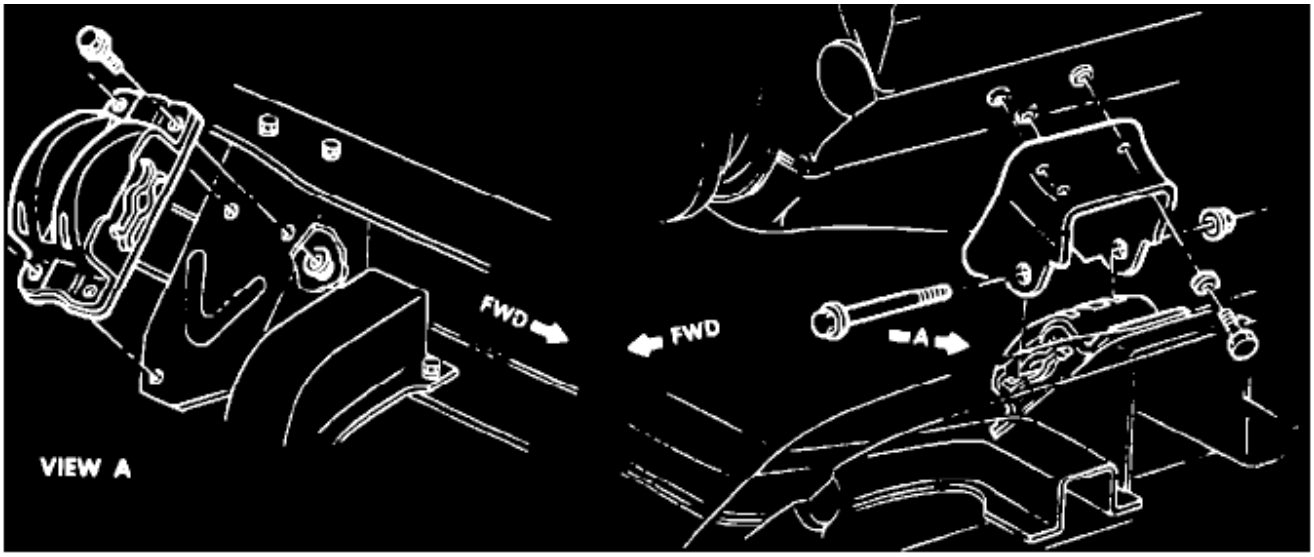


Fig. 5 Engine mount replacement. G models w/V6-262 engine



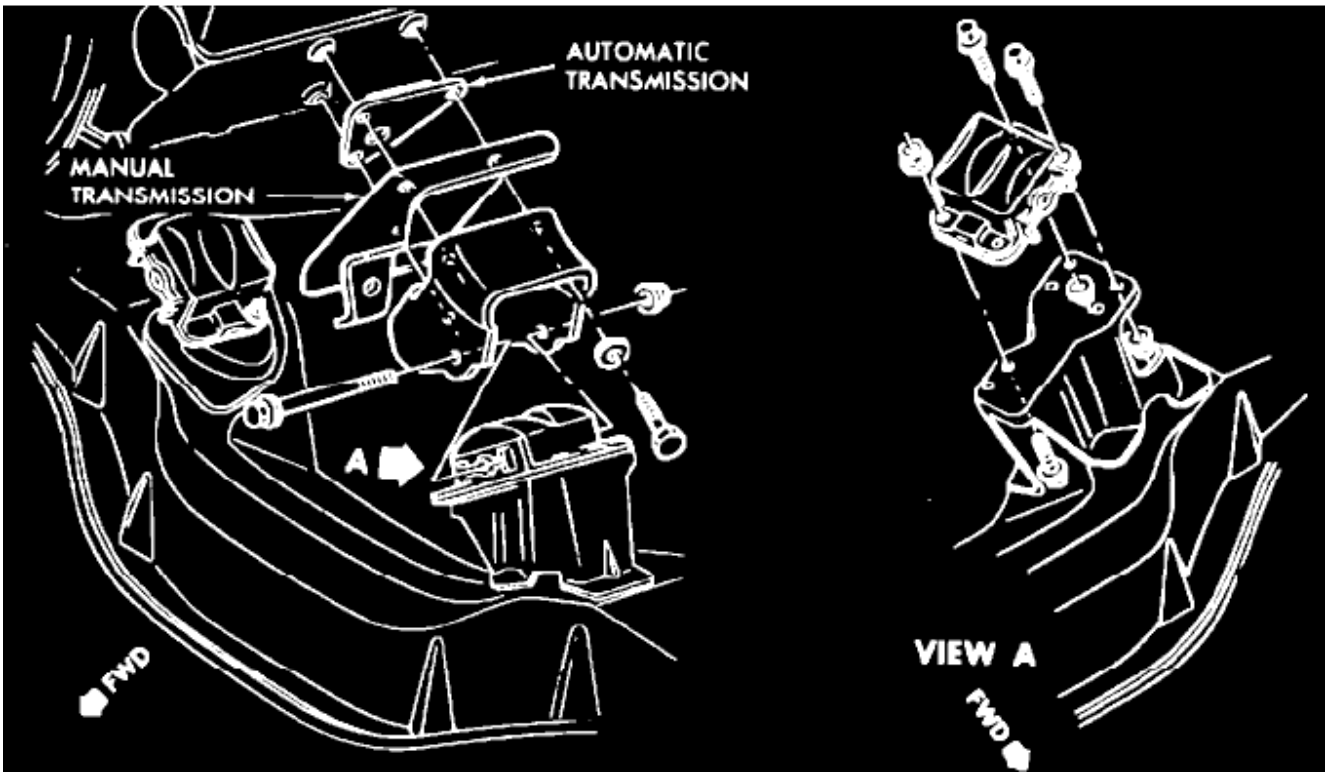


Fig. 6 Engine mount replacement. C, K, P, R & V models w/V8 engines

Fig. 7 Engine mount replacement. G models w/V8 engines

V6 & V8 Engines

1. Working from below frame mounting bracket, remove engine mount through bolt. When replacing right side mount on models with V6-262 engine it is only necessary to loosen the through

bolt.

2. Raise and support engine, then remove mount attaching bolts and the mount. Raise engine only enough to gain sufficient clearance for removal. Check for interference between rear of engine and cowl panel.

3. Install new engine mount to engine, then tighten attaching bolts.

4. Install and tighten engine mount through bolt.

Engine Oil Pressure: Specifications

Normal Oil Pressure 30-45 psi

Engine Oil: Technical Service Bulletins Engine - GM dexos 1 and dexos 2(R) Oil Specifications

INFORMATION

Bulletin No.: 11-00-90-001

Date: March 14, 2011

Subject: Global Information for GM dexos1(TM) and GM dexos2(TM) Engine Oil Specifications for Spark Ignited and Diesel Engines, Available Licensed Brands, and Service Fill for Adding or Complete Oil Change

Models:

2012 and Prior GM Passenger Cars and Trucks Excluding All Vehicles Equipped with Duramax(TM) Diesel Engines

GM dexos 1(TM) Information Center Website

Refer to the following General Motors website for dexos 1(TM) information about the different licensed brands that are currently available: http://www.gmdexos.com

GM dexos 1(TM) Engine Oil Trademark and Icons

The dexos(TM) specification and trademarks are exclusive to General Motors, LLC.

Only those oils displaying the dexos‹›(TM) trademark and icon on the front label meet the demanding performance requirements and stringent quality standards set forth in the dexos‹›(TM) specification.

Look on the front label for any of the logos shown above to identify an authorized, licensed dexos 1(TM) engine oil.

GM dexos 1(TM) Engine Oil Specification

Important General Motors dexos 1(TM) engine oil specification replaces the previous General Motors specifications GM6094M, GM4718M and GM-LL-A-025 for most GM gasoline engines. The oil specified for use in GM passenger cars and trucks, PRIOR to the 2011 model year remains acceptable for those previous vehicles. However, dexos 1(TM) is backward compatible and can be used in those older vehicles.

In North America, starting with the 2011 model year, GM introduced dexos 1(TM) certified engine oil as a factory fill and service fill for gasoline engines. The reasons for the new engine oil specification are as follows:

- To meet environmental goals such as increasing fuel efficiency and reducing engine emissions.

- To promote long engine life.

- To minimize the number of engine oil changes in order to help meet the goal of lessening the industry's overall dependence on crude oil.

dexos 1(TM) is a GM-developed engine oil specification that has been designed to provide the following benefits:

- Further improve fuel economy, to meet future corporate average fuel economy (CAFE) requirements and fuel economy retention by allowing the oil to maintain its fuel economy benefits throughout the life of the oil.

- More robust formulations for added engine protection and aeration performance.

- Support the GM Oil Life System, thereby minimizing the replacement of engine oil, before its life has been depleted.

- Reduce the duplication of requirements for a large number of internal GM engine oil specifications.

International Lubricants Standardization and Approval Committee (ILSAC)

GF-5 Standard

In addition to GM dexos 1(TM), a new International Lubricants Standardization and Approval Committee (ILSAC) standard called GF-5, was introduced in October 2010.

- There will be a corresponding API category, called: SN Resource Conserving. The current GF-4 standard was put in place in 2004 and will become obsolete in October 2011. Similar to dexos 1(TM), the GF-5 standard will use a new fuel economy test, Sequence VID, which demands a statistically significant increase in fuel economy versus the Sequence VIB test that was used for GF-4.

- It is expected that all dexos 1(TM) approved oils will be capable of meeting the GF-5 standard. However, not all GF-5 engine oils will be capable of meeting the dexos 1(TM) specification.

- Like dexos(TM), the new ILSAC GF-5 standard will call for more sophisticated additives. The API will begin licensing marketers during October 2010, to produce and distribute GF-5 certified products, which are expected to include SAE 0W-20, 0W-30, 5W-20, 5W-30 and 10W-30 oils.

Corporate Average Fuel Economy (CAFE) Requirements Effect on Fuel Economy

Since CAFE standards were first introduced in 1974, the fuel economy of cars has more than doubled, while the fuel economy of light trucks has increased by more than 50 percent. Proposed CAFE standards call for a continuation of increased fuel economy in new cars and trucks. To meet these future requirements, all aspects of vehicle operation are being looked at more critically than ever before.

New technology being introduced in GM vehicles designed to increase vehicle efficiency and fuel economy include direct injection, cam phasing, turbocharging and active fuel management (AFM). The demands of these new technologies on engine oil also are taken into consideration when determining new oil specifications. AFM for example can help to achieve improved fuel economy. However alternately deactivating and activating the cylinders by not allowing the intake and exhaust valves to open contributes to additional stress on the engine oil.

Another industry trend for meeting tough fuel economy mandates has been a shift toward lower viscosity oils.

dexos 1(TM) will eventually be offered in several viscosity grades in accordance with engine needs: SAE 0W-20, 5W-20, 0W-30 and 5W-30.

Using the right viscosity grade oil is critical for proper engine performance. Always refer to the Maintenance section of a vehicle Owner Manual for the proper viscosity grade for the engine being serviced.

GM Oil Life System in Conjunction With dexos (TM) Supports Extended Oil Change Intervals

To help conserve oil while maintaining engine protection, many GM vehicles are equipped with the GM Oil Life System. This system can provide oil change intervals that exceed the traditional 3,000 mile (4,830 km) recommendation.

The dexos (TM) specification, with its requirements for improved oil robustness, compliments the GM Oil Life System by supporting extended oil change intervals over the lifetime of a vehicle.

If all GM customers with GM Oil Life System equipped vehicles would use the system as intended, GM estimates that more than 100 million gallons of oil could be saved annually.

GM dexos 2(TM) Information Center Website

Refer to the following General Motors website for dexos 2(TM) information about the different licensed brands that are currently available: http://www.gmdexos.com

GM dexos 2(TM) Engine Oil Trademark and Icons

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

The dexos (TM) specification and trademarks are exclusive to General Motors, LLC.

Only those oils displaying the dexos (TM) trademark and icon on the front label meet the demanding performance requirements and stringent quality standards set forth in the dexos (TM)specification.

Look on the front label for any of the logos shown above to identify an authorized, licensed dexos 2(TM) engine oil.

GM dexos 2(TM) Engine Oil Specification

- dexos 2(TM) is approved and recommended by GM for use in Europe starting in model year 2010 vehicles, regardless of where the vehicle was manufactured.

- dexos 2(TM) is the recommended service fill oil for European gasoline engines.

Important The Duramax(TM) diesel engine is the exception and requires lubricants meeting specification CJ-4.

- dexos 2(TM) is the recommended service fill oil for European light-duty diesel engines and replaces GM-LL-B-025 and GM-LL-A-025.

- dexos 2(TM) protects diesel engines from harmful soot deposits and is designed with limits on certain chemical components to prolong catalyst life and protect expensive emission reduction systems. It is a robust oil, resisting degradation between oil changes and maintaining optimum performance longer.

Disclaimer

Engine Oil: Technical Service Bulletins Maintenance - Updated Minimum Acceptable Oil Levels

85-54 6 (VI) MAR., 1985 Subject:

MINIMUM ACCEPTABLE OIL LEVELS

Model and Year:ALL PASSENGER AND LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

This cancels and replaces Chevrolet Dealer Service Information Bulletin 83-I-57 which should be destroyed.

The following chart provides a guide for minimum acceptable oil levels "as received" from the factory. Only those components which have levels less than indicated below should have additional oil installed.

Engine - Full mark to 6 mm (.24 in.) below full mark.

Transmission

a) Automatic - With engine idling, transmission selector in "Park", vehicle on a level surface and oil temperature between 10 to 38~C the oil level on the following transmissions should be as indicated:

440-T4 Transmission:

Oil level should be in middle of cross-hatch area.

125/125C Transmission:

Oil level should be slightly above full level.

All other Transmissions:

Oil level should be slightly below add level. If oil level gauge has dimples below add mark, oil level should be between these two dimples.

b) Manual 1) Lower edge of inspection plug hole on rear wheel drive vehicles.

2) Between cold level range dimples or at cold level mark on front wheel drive vehicles.

Differential - Lower edge of inspection plug hole to 9.5 mm

(.37 in.) below lower edge of inspection plug hole.

Transfer Case - Lower edge of inspection plug hole.

Engine Oil: Technical Service Bulletins Engine Oil - Discoloration (Oil Dye)

Number: 86-25

Section: 6

Date: Jan. 1986

Subject: ENGINE OIL DISCOLORATION

Model and Year ALL 1985-1986 MODELS

TO: ALL CHEVROLET DEALERS

General Motors Corporation engine plants utilize engine oil dye from time to time in various engines as an aid to oil leak detection during the manufacturing process. The dye causes the oil to glow bright yellow when exposed to a "black" light. There are several sources for "black" lights, such as Kent Moore Tool, Snap-On Tool, Mac Tool, etc.

Some of the dye material used gives the oil a slight red or green tint, and in some cases has been mistaken by service personnel for automatic transmission fluid or engine coolant. If the engine oil was contaminated with engine coolant, the oil would be a gray or "milky white" color. Transmission oil would tint the engine oil light pink, however, it would not glow bright yellow when exposed to a "black" light.

Dealers should be advised that the dye is in no way detrimental and that the oil should not be changed if this condition exists.

If the engine oil is suspected of being contaminated with foreign material, a small sample (1/4 cup) should be exposed to a "black light". If the oil sample does not glow bright yellow, it is possible that the oil is contaminated and should be changed to prevent engine damage.

Engine Oil: Specifications

Engine Oil with Filter ..... 5.0 quarts (4.7 liters)

NOTE: All capacities are approximate. When adding, be sure to fill to the approximate level. Recheck fluid level after filling

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Oil Filter: Technical Service Bulletins Engine - Noise/Damage Oil Filter Application Importance

INFORMATION

Bulletin No.: 07-06-01-016B

Date: July 27, 2009

Subject: Information on Internal Engine Noise or Damage After Oil Filter Replacement

Models:

2010 and Prior Passenger Cars and Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X

Supercede: This bulletin is being updated to add model years. Please discard Corporate Bulletin Number 07-06-01-016A (Section 06 - Engine/Propulsion System).

Important Engine damage that is the result of an incorrect or improperly installed engine oil filter is not a warrantable claim. The best way to avoid oil filter quality concerns is to purchase ACDelco(R) oil filters directly from GMSPO.

Oil filter misapplication may cause abnormal engine noise or internal damage. Always utilize the most recent parts information to ensure the correct part number filter is installed when replacing oil filters. Do not rely on physical dimensions alone. Counterfeit copies of name brand parts have been discovered in some aftermarket parts systems. Always ensure the parts you install are from a trusted source. Improper oil filter installation may result in catastrophic engine damage.

Refer to the appropriate Service Information (SI) installation instructions when replacing any oil filter and pay particular attention to procedures for proper cartridge filter element alignment. If the diagnostics in SI (Engine Mechanical) lead to the oil filter as the cause of the internal engine noise or damage, dealers should submit a field product report. Refer to Corporate Bulletin Number 02-00-89-002I (Information for Dealers on How to Submit a Field Product Report).

Disclaimer

Oil Level Warning Indicator: Description and Operation

On models less gauges, the oil/choke warning indicator lamp should be illuminated when the ignition switch is in the Run or Start position. When the engine is started, the choke warning indicator lamp should go off. If the lamp fails to illuminate with ignition switch in Run or Start position with engine not operating, a burnt out bulb or fuse or defect in choke electrical system is indicated. If lamp remains on after engine has been started, a problem in the engine oil pressure system or electrical choke system exist. On models equipped with gauges, the choke warning indicator lamp should be illuminated when the ignition switch is in the Run or Start position. When the engine is started, the choke warning indicator lamp should go off. If fails to illuminate with ignition switch in Run or Start position with engine not operating, a burnt out bulb or fuse or defect in choke electrical system is indicated. If lamp remains on after engine has been started, a problem in the alternator circuit is indicated. After service has been completed, the lamp operation should return to normal.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Engine, Cooling and Exhaust > Engine > Engine Lubrication > Oil Line, Engine > Component Information > Technical Service Bulletins > Recalls for Oil Line: > 85C1466A > Aug > 85 > Campaign - Engine Oil Cooler Hose May Burst

Campaign - Engine Oil Cooler Hose May Burst

Number: 85C14

Section: 6 & 6A

Date: August, 1985

PRODUCT CAMPAIGN 85C14 ENGINE OIL COOLER LINES MAY FAIL 1985 C/K/G/P MODEL LIGHT DUTY TRUCKS EQUIPPED WITH AN ENGINE OIL COOLER TO:

ALL CHEVROLET DEALERS

General Motors has determined that some 1985 C/K/G/P Light Duty trucks equipped with a gasoline engine or a 6.2L diesel engine that have an engine oil cooler, RPO KC4, may experience failure of the engine oil cooler hose/hoses. During normal operation the hoses may burst, resulting in a rapid engine oil loss which could result in internal engine damage.

To prevent the possibility of this condition ocurring, involved vehicles must be inspected for suspect oil cooler lines and replacement lines installed if necessary.

Vehicles Involved

Involved are certain 1985 C/K/G/P Light Duty model trucks equipped with an engine oil cooler. The oil cooler is available on some involved vehicles equipped with gas engines and is standard on P30 Models equipped with a 7.4L engine (RPO LE8) or on 6.2L diesel (RPO LH6 or LL4) equipped vehicles.

The vehicles involved were built within the following plant and VIN breakpoints.

PLANT MODEL FROM THROUGH

Detroit P F3308157 F3313189

Lordstown G Van F7113572 F7127667

Scarborough G Van F4106076 F4119332

Flint #1 C-K-D FF320076 FF339542

Flint #2 C-K-D FF115048 FF127844

Janesville C-K FJ123335 FJ126924

St. Louis C-K FS115388 FS128599

Oshawa C-K F1136523 F1137392

Involved vehicles have been identified by Vehicle Identification Number Computer Listings. Computer listings contain the complete Vehicle Identification Number, owner name and address data, and are furnished to the involved dealers with the campaign bulletin. Owner name and address data furnished will enable dealers to follow-up with owners involved in this campaign.

These listings may contain owner names and addresses obtained from State Motor Vehicle Registration Records. The use of such motor vehicle registration data for any other purpose is a violation of law in several states. Accordingly, you are urged to limit the use of this listing to the follow-up necessary to complete this campaign. Any dealer not receiving a computer listing with the campaign bulletin was not shipped any involved vehicles.

Owner Notification, Dealer Responsibility, and Service Procedure

OWNER NOTIFICATION

Owners will be notified of this campaign on their vehicles by Chevrolet Motor Division (see copy of Owner Letter included with this bulletin).

DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time forward.

Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle.

Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin.

MANUFACTURING DATE CODE
P-H 719-10 - 1/2 - 12.5mm 10 2654 A
NOTE: REPLACE ANY OIL COOLER LINES WITH A MANUFACTURING DATE CODE OF 2654 AS SHOWN ABOVE
Figure No. 1

Figure No. 1

SERVICE PROCEDURE

Inspect both engine oil cooler lines for manufacturing date code (reference the 1985 Light Duty Truck Service Manual, ST-330-85, for cooler line location). Lines marked with a date code of 2654, as shown in Figure No. 1, must be replaced. In addition, replace the cooler line if the date code cannot be read or if the date code does not appear on the hose section of the line.

Lines with identification numbers other than above are OK and are not to be replaced.

Parts Information

Parts required to complete this modification are to be obtained from General Motors Warehousing and Distribution Division (GMWDD). To ensure that these parts will be obtained as soon as possible they should be ordered from GMWDD on a C.I.O. order with no special instruction code, but on an advise code (2).

IMPORTANT: Defective oil line(s) removed from the involved vehicles will be retained by the dealer in accordance with the instructions outlined in the dealers current Policy and Procedures Manual.

PART ADDITIONAL REQUIRED

NUMBER DESCRIPTION APPL. EQUIPMENT

14054350 Inlet Oil Cooler Line P-Model LL4 (6.2L Diesel)

14054372 Inlet Oil Cooler Line P-Model LT9 (5.7L Gas) &

14054373 Outlet Oil Cooler Line KC4 (Engine Oil Cooler)

15595588 Inlet Oil Cooler Line P 30 Model LE8 (7.4L Gas)

15595589 Outlet Oil Cooler Line

15595994 Inlet Oil Cooler Line G Van LL4 & LH6

15595995 Outlet Oil Cooler Line (6.2L Diesel)

15598396 Inlet Oil Cooler Line G Van LT9 or LS9 (5.7L Gas)

15598397 Outlet Oil Cooler Line or LF3 or LE9 (5.0L Gas) & KC4 (Engine Oil Cooler)

15592917 Inlet Oil Cooler Line G Van LB1 (4.3L Gas) & KC4 (Engine Oil Cooler)

14055584 Outlet Oil Cooler Line K Model KC4 (Engine Oil Cooler)

14061346 Inlet Oil Cooler Line K Model LL4 or LH6

14061347 Outlet Oil Cooler Line (6.2L Diesel)

14061346 Inlet Oil Cooler Line C Model LL4 or LH6

14061347 Outlet Oil Cooler Line (6.2L Diesel)

15522436 Inlet Oil Cooler Line C Model LB1 (4.3L Gas) & KC4

15522437 Outlet Oil Cooler Line (Engine Oil Cooler)

14055581 Inlet Oil Cooler Line C Model KC4 (Engine Oil Cooler)

14055582 Outlet Oil Cooler Line

Claim Information

CLAIM INFORMATION CHART

MODEL	RPO	ENGINE	REPAIR PERFORMED TO OIL COOLER LINES	PART NUMBER	PC	FAILED PART NO.	** PARTS ALLOW	FC	LABOP	LAB HRS	* OTH HRS	*** NET AMT
ALL	ALL	ALL	INSPECT ONLY NO FURTHER ACTION					00	V2790	.2	.1	
P	LL4	6.2L DSL	RPL INLET	14054350	1	14054350		00	V2791	.5	.1	1.42
P	LT9 KC4	5.7L GAS OIL COOLER	RPL INLET OR OUTLET	14054372 14054373	1	14054372		00	V2792	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	14054372 14054373	2	14054373		00	V2793	.6	.1	1.42
P	LE8	7.4L GAS	RPL INLET OR OUTLET	15595588 15595589	1	15595588		00	V2794	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	15595588 15595589	2	15595589		00	V2795	.6	.1	1.42
G-VAN	LL4 LL6	6.2L DSL 6.2L DSL	RPL INLET OR OUTLET	15595994 15595995	1	15595994		00	V2796	.7	.1	1.42
			RPL BOTH INLET AND OUTLET	15595994 15595995	2	15595995		00	V2797	.8	.1	1.42
G-VAN	LT9 LS9 LF3 LE9 KC4	5.7L GAS 5.7L GAS 5.0L GAS 5.0L GAS OIL COOLER	RPL INLET OR OUTLET	15598396 15598397	1	15598396		00	V2798	.7	.1	1.42
			RPL BOTH INLET AND OUTLET	15598396 15598397	2	15598397		00	V2799	.8	.1	1.42
G-VAN	LB1	4.3L GAS	RPL INLET	15592917	1	15592917		00	V2840	.7	.1	1.42
K-TRK	KC4	OIL COOLER GAS ENGINE	RPL OUTLET	14055584	1	14055584		00	V2847	.5	.1	1.42
C-TRK	KC4	OIL COOLER GAS ENGINE	RPL INLET OR OUTLET	14055581 14055582	1	14055581		00	V2841	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	14055581 14055582	2	14055582		00	V2842	.6	.1	1.42
C/K	LL4 LH6	6.2L DSL 6.2L DSL	RPL INLET OR OUTLET	14061346 14061347	1	14061346		00	V2843	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	14061346 14061347	2	14061347		00	V2844	.6	.1	1.42
C-TRK	LB1 KC4	4.3L GAS OIL COOLER	RPL INLET OR OUTLET	15522436 15522437	1	15522436		00	V2845	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	15522436 15522437	2	15522437		00	V2846	.6	.1	1.42

IMPORTANT: Submit a Product Campaign Claim based on the repairs performed and the labor information shown above.

* Campaign Administrative Allowance.

** The Parts Allowance is the sum total of the current GMWDD Dealer Net plus 30% of all parts required for the repair.

***The $1.42 in the NET AMOUNT COLUMN is the material allowance for engine oil used with all repairs except V2790.

Dealers will automatically receive the correct allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

Submit a Product Campaign Claim with the information indicated below:

Parts Failed Parts Failure Labor Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

00 V2790 .2 .1

DESCRIPTION: Inspect engine oil cooler lines, all models. Vehicle not involved, no further action required.

"P" MODEL CLAIM INFORMATION

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14054350 00 V2791 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet line, vehicle equipped with RPO LL4 (6.2L Diesel engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14054372 00 V2792 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet or one outlet line, vehicle equipped with RPO LT9 (5.7L gas engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14054373 00 V2793 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace both inlet and outlet lines, vehicle equipped with RPO LT9 (5.7L gas engine).

"P" MODEL CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15595588 00 V2794 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet or one outlet line, vehicle equipped with RPO LE8 (7.4L gas engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 15595589 00 V2795 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace both inlet and outlet lines, vehicle equipped with RPO LE8 (7.4L gas engine).

"G" VAN MODEL CLAIM INFORMATION

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15595994 00 V2796 .7 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet or one outlet line, vehicle equipped with RPO LH6 or LL4 (6.2L diesel engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 15595995 00 V2797 .8 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace both inlet and outlet lines, vehicle equipped with RPO LH6 or LL4 (6.2L diesel engine).

"G" VAN MODEL CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15598396 00 V2798 .7 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet or one outlet line, vehicle equipped with RPO LT9/ LS9 (5.7L gas engine) or RPO

LF3/LE9 (5.0L gas engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 15598397 00 V2799 .8 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace both inlet and outlet lines, vehicle equipped with RPO LT9/LS9 (5.7L gas engine) or RPO

LF3/LE9 (5.0L gas engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15592917 00 V2840 .7 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace inlet line, vehicle equipped with RPO LBI (4.3L gas engine).

"C/K" MODEL CLAIMS INFORMATION

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14055581 00 V2841 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "C" model only, replace inlet or outlet line, vehicle equipped with RPO KC4 (oil cooler) and gas engine.

"C/K" MODEL CLAIMS INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14055582 00 V2842 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "C" model only, replace both inlet and outlet lines, vehicle equipped with RPO KC4 (oil cooler) and gas

engine.

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14061346 00 V2843 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, C/K models, replace inlet or outlet line, vehicle equipped with RPO LL4/ LH6 (6.2L diesel engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14061347 00 V2844 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, C/K models, replace both inlet and outlet lines, vehicle equipped with RPO LL4/LH6 (6.2L diesel

engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15522436 00 V2845 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "C" model only, replace inlet or outlet line, vehicle equipped with RPO LB1 (4.3L gas engine and RPO

KC4 oil cooler).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 15522437 00 V2846 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "C" model only, replace both inlet and outlet lines, vehicle equipped with RPO LBI (4.3L gas engine and

RPO KC4 (oil cooler)).

CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14055584 00 V2847 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "K" model only, replace outlet lines, vehicle equipped with gas engine and RPO KC4 (oil cooler).

*Campaign Administrative Allowance.

**The Parts Allowance should be the sum total of the current GMWDD Dealer Net plus 30% of all parts required for the repair.

***The $1.42 in the "Net Amount Column" represents the material allowance for engine oil used in comjunction with all labor operations except V2790.

Dealers will automatically receive the correct labor allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

In addition to the normal dealer claim information, a "Claim Information Chart," has been prepared on page 10 to assist Dealer personnel in identifying the repair categories of each vehicle involved.

Campaign Identification Label

CAMPAIGN IDENTIFICATION LABEL

Each vehicle modified in accordance with the instructions outlined in this Product Campaign Bulletin will require a "Campaign Identification Label." Each label provides a space to include the five digit dealer code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen.

Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner.

Apply "Campaign Identification Label" only on a clean dry surface.

Administrative Procedure

REFER TO THE CURRENT CHEVROLET SERVICE POLICIES AND PROCEDURES MANUAL AND CLAIMS PROCESSING MANUAL FOR CAMPAIGN HANDLING AND ADMINISTRATIVE PROCEDURES.

(Notification Used By Chevrolet Motor Division)

Dear Chevrolet Truck Owner:

General Motors has determined that some 1985 C/K/G/P Light Duty trucks equipped with a gasoline engine or a 6.2L diesel engine that has an engine oil cooler, RPO KC4, may experience failure of the engine oil cooler hose/hoses. During normal operation, the hoses may burst, resulting in a rapid engine oil loss which could result in internal engine damage.

To prevent the possibility of this condition occurring on your vehicle, please contact your Chevrolet Dealer on or after the date shown below to arrange for a service date. Your dealer will inspect the oil cooler lines and replace them if necessary. This service will be completed at no charge to you.

Instructions have been sent to your Chevrolet dealer. It is estimated that parts will be available August 23, 1985. The labor time to inspect your vehicle is about 10 minutes. If it is necessary to replace the oil cooler lines, it will take approximately one (1) hour longer. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

The enclosed Owner Reply Card identifies your vehicle. Presentation of this card to your dealer will assist them in making the necessary correction to your vehicle in the shortest possible time. If you have sold or traded your vehicle, please let us know by completing the postage paid owner reply card and returning it to us.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your continued satisfaction with our products.

Campaign - Engine Oil Cooler Hose May Burst

Number: 85C14

Section: 6 & 6A

Date: August, 1985

PRODUCT CAMPAIGN 85C14 ENGINE OIL COOLER LINES MAY FAIL 1985 C/K/G/P MODEL LIGHT DUTY TRUCKS EQUIPPED WITH AN ENGINE OIL COOLER TO:

ALL CHEVROLET DEALERS

General Motors has determined that some 1985 C/K/G/P Light Duty trucks equipped with a gasoline engine or a 6.2L diesel engine that have an engine oil cooler, RPO KC4, may experience failure of the engine oil cooler hose/hoses. During normal operation the hoses may burst, resulting in a rapid engine oil loss which could result in internal engine damage.

To prevent the possibility of this condition ocurring, involved vehicles must be inspected for suspect oil cooler lines and replacement lines installed if necessary.

Vehicles Involved

Involved are certain 1985 C/K/G/P Light Duty model trucks equipped with an engine oil cooler. The oil cooler is available on some involved vehicles equipped with gas engines and is standard on P30 Models equipped with a 7.4L engine (RPO LE8) or on 6.2L diesel (RPO LH6 or LL4) equipped vehicles.

The vehicles involved were built within the following plant and VIN breakpoints.

PLANT MODEL FROM THROUGH

Detroit P F3308157 F3313189

Lordstown G Van F7113572 F7127667

Scarborough G Van F4106076 F4119332

Flint #1 C-K-D FF320076 FF339542

Flint #2 C-K-D FF115048 FF127844

Janesville C-K FJ123335 FJ126924

St. Louis C-K FS115388 FS128599

Oshawa C-K F1136523 F1137392

Involved vehicles have been identified by Vehicle Identification Number Computer Listings. Computer listings contain the complete Vehicle Identification Number, owner name and address data, and are furnished to the involved dealers with the campaign bulletin. Owner name and address data furnished will enable dealers to follow-up with owners involved in this campaign.

These listings may contain owner names and addresses obtained from State Motor Vehicle Registration Records. The use of such motor vehicle registration data for any other purpose is a violation of law in several states. Accordingly, you are urged to limit the use of this listing to the follow-up necessary to complete this campaign. Any dealer not receiving a computer listing with the campaign bulletin was not shipped any involved vehicles.

Owner Notification, Dealer Responsibility, and Service Procedure

OWNER NOTIFICATION

Owners will be notified of this campaign on their vehicles by Chevrolet Motor Division (see copy of Owner Letter included with this bulletin).

DEALER CAMPAIGN RESPONSIBILITY

Dealers are to service all vehicles subject to this campaign at no charge to owners, regardless of mileage, age of vehicle, or ownership, from this time forward.

Whenever a vehicle subject to this campaign is taken into your new or used vehicle inventory, or it is in your dealership for service in the future you should take the steps necessary to be sure the campaign correction has been made before reselling or releasing the vehicle.

Owners of vehicles recently sold from your new vehicle inventory are to be contacted by the dealer, and arrangements made to make the required modification according to instructions contained in this bulletin.

MANUFACTURING DATE CODE
P-H 719-10 - 1/2 - 12.5mm 10 2654 A
NOTE: REPLACE ANY OIL COOLER LINES WITH A MANUFACTURING DATE CODE OF 2654 AS SHOWN ABOVE
Figure No. 1

Figure No. 1

SERVICE PROCEDURE

Inspect both engine oil cooler lines for manufacturing date code (reference the 1985 Light Duty Truck Service Manual, ST-330-85, for cooler line location). Lines marked with a date code of 2654, as shown in Figure No. 1, must be replaced. In addition, replace the cooler line if the date code cannot be read or if the date code does not appear on the hose section of the line.

Lines with identification numbers other than above are OK and are not to be replaced.

Parts Information

Parts required to complete this modification are to be obtained from General Motors Warehousing and Distribution Division (GMWDD). To ensure that these parts will be obtained as soon as possible they should be ordered from GMWDD on a C.I.O. order with no special instruction code, but on an advise code (2).

IMPORTANT: Defective oil line(s) removed from the involved vehicles will be retained by the dealer in accordance with the instructions outlined in the dealers current Policy and Procedures Manual.

PART ADDITIONAL REQUIRED

NUMBER DESCRIPTION APPL. EQUIPMENT

14054350 Inlet Oil Cooler Line P-Model LL4 (6.2L Diesel)

14054372 Inlet Oil Cooler Line P-Model LT9 (5.7L Gas) &

14054373 Outlet Oil Cooler Line KC4 (Engine Oil Cooler)

15595588 Inlet Oil Cooler Line P 30 Model LE8 (7.4L Gas)

15595589 Outlet Oil Cooler Line

15595994 Inlet Oil Cooler Line G Van LL4 & LH6

15595995 Outlet Oil Cooler Line (6.2L Diesel)

15598396 Inlet Oil Cooler Line G Van LT9 or LS9 (5.7L Gas)

15598397 Outlet Oil Cooler Line or LF3 or LE9 (5.0L Gas) & KC4 (Engine Oil Cooler)

15592917 Inlet Oil Cooler Line G Van LB1 (4.3L Gas) & KC4 (Engine Oil Cooler)

14055584 Outlet Oil Cooler Line K Model KC4 (Engine Oil Cooler)

14061346 Inlet Oil Cooler Line K Model LL4 or LH6

14061347 Outlet Oil Cooler Line (6.2L Diesel)

14061346 Inlet Oil Cooler Line C Model LL4 or LH6

14061347 Outlet Oil Cooler Line (6.2L Diesel)

15522436 Inlet Oil Cooler Line C Model LB1 (4.3L Gas) & KC4

15522437 Outlet Oil Cooler Line (Engine Oil Cooler)

14055581 Inlet Oil Cooler Line C Model KC4 (Engine Oil Cooler)

14055582 Outlet Oil Cooler Line

Claim Information

CLAIM INFORMATION CHART

MODEL	RPO	ENGINE	REPAIR PERFORMED TO OIL COOLER LINES	PART NUMBER	PC	FAILED PART NO.	** PARTS ALLOW	FC	LABOP	LAB HRS	* OTH HRS	*** NET AMT
ALL	ALL	ALL	INSPECT ONLY NO FURTHER ACTION					00	V2790	.2	.1	
P	LL4	6.2L DSL	RPL INLET	14054350	1	14054350		00	V2791	.5	.1	1.42
P	LT9 KC4	5.7L GAS OIL COOLER	RPL INLET OR OUTLET	14054372 14054373	1	14054372		00	V2792	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	14054372 14054373	2	14054373		00	V2793	.6	.1	1.42
P	LE8	7.4L GAS	RPL INLET OR OUTLET	15595588 15595589	1	15595588		00	V2794	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	15595588 15595589	2	15595589		00	V2795	.6	.1	1.42
G-VAN	LL4 LL6	6.2L DSL 6.2L DSL	RPL INLET OR OUTLET	15595994 15595995	1	15595994		00	V2796	.7	.1	1.42
			RPL BOTH INLET AND OUTLET	15595994 15595995	2	15595995		00	V2797	.8	.1	1.42
G-VAN	LT9 LS9 LF3 LE9 KC4	5.7L GAS 5.7L GAS 5.0L GAS 5.0L GAS OIL COOLER	RPL INLET OR OUTLET	15598396 15598397	1	15598396		00	V2798	.7	.1	1.42
			RPL BOTH INLET AND OUTLET	15598396 15598397	2	15598397		00	V2799	.8	.1	1.42
G-VAN	LB1	4.3L GAS	RPL INLET	15592917	1	15592917		00	V2840	.7	.1	1.42
K-TRK	KC4	OIL COOLER GAS ENGINE	RPL OUTLET	14055584	1	14055584		00	V2847	.5	.1	1.42
C-TRK	KC4	OIL COOLER GAS ENGINE	RPL INLET OR OUTLET	14055581 14055582	1	14055581		00	V2841	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	14055581 14055582	2	14055582		00	V2842	.6	.1	1.42
C/K	LL4 LH6	6.2L DSL 6.2L DSL	RPL INLET OR OUTLET	14061346 14061347	1	14061346		00	V2843	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	14061346 14061347	2	14061347		00	V2844	.6	.1	1.42
C-TRK	LB1 KC4	4.3L GAS OIL COOLER	RPL INLET OR OUTLET	15522436 15522437	1	15522436		00	V2845	.5	.1	1.42
			RPL BOTH INLET AND OUTLET	15522436 15522437	2	15522437		00	V2846	.6	.1	1.42

IMPORTANT: Submit a Product Campaign Claim based on the repairs performed and the labor information shown above.

* Campaign Administrative Allowance.

** The Parts Allowance is the sum total of the current GMWDD Dealer Net plus 30% of all parts required for the repair.

***The $1.42 in the NET AMOUNT COLUMN is the material allowance for engine oil used with all repairs except V2790.

Dealers will automatically receive the correct allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

Submit a Product Campaign Claim with the information indicated below:

Parts Failed Parts Failure Labor Labor *Other Net

Count Part No. Allowance Code Operation Hours Hours Amount

00 V2790 .2 .1

DESCRIPTION: Inspect engine oil cooler lines, all models. Vehicle not involved, no further action required.

"P" MODEL CLAIM INFORMATION

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14054350 00 V2791 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet line, vehicle equipped with RPO LL4 (6.2L Diesel engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14054372 00 V2792 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet or one outlet line, vehicle equipped with RPO LT9 (5.7L gas engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14054373 00 V2793 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace both inlet and outlet lines, vehicle equipped with RPO LT9 (5.7L gas engine).

"P" MODEL CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15595588 00 V2794 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet or one outlet line, vehicle equipped with RPO LE8 (7.4L gas engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 15595589 00 V2795 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace both inlet and outlet lines, vehicle equipped with RPO LE8 (7.4L gas engine).

"G" VAN MODEL CLAIM INFORMATION

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15595994 00 V2796 .7 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet or one outlet line, vehicle equipped with RPO LH6 or LL4 (6.2L diesel engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 15595995 00 V2797 .8 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace both inlet and outlet lines, vehicle equipped with RPO LH6 or LL4 (6.2L diesel engine).

"G" VAN MODEL CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15598396 00 V2798 .7 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace one inlet or one outlet line, vehicle equipped with RPO LT9/ LS9 (5.7L gas engine) or RPO

LF3/LE9 (5.0L gas engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 15598397 00 V2799 .8 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace both inlet and outlet lines, vehicle equipped with RPO LT9/LS9 (5.7L gas engine) or RPO

LF3/LE9 (5.0L gas engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15592917 00 V2840 .7 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, replace inlet line, vehicle equipped with RPO LBI (4.3L gas engine).

"C/K" MODEL CLAIMS INFORMATION

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14055581 00 V2841 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "C" model only, replace inlet or outlet line, vehicle equipped with RPO KC4 (oil cooler) and gas engine.

"C/K" MODEL CLAIMS INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14055582 00 V2842 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "C" model only, replace both inlet and outlet lines, vehicle equipped with RPO KC4 (oil cooler) and gas

engine.

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14061346 00 V2843 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, C/K models, replace inlet or outlet line, vehicle equipped with RPO LL4/ LH6 (6.2L diesel engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 14061347 00 V2844 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, C/K models, replace both inlet and outlet lines, vehicle equipped with RPO LL4/LH6 (6.2L diesel

engine).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 15522436 00 V2845 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "C" model only, replace inlet or outlet line, vehicle equipped with RPO LB1 (4.3L gas engine and RPO

KC4 oil cooler).

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

2 15522437 00 V2846 .6 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "C" model only, replace both inlet and outlet lines, vehicle equipped with RPO LBI (4.3L gas engine and

RPO KC4 (oil cooler)).

CLAIM INFORMATION (CONT'D)

Parts Failed **Parts Failure Labor Labor *Other ***Net

Count Part No. Allowance Code Operation Hours Hours Amount

1 14055584 00 V2847 .5 .1 1.42

DESCRIPTION: Inspect both oil cooler lines, "K" model only, replace outlet lines, vehicle equipped with gas engine and RPO KC4 (oil cooler).

*Campaign Administrative Allowance.

**The Parts Allowance should be the sum total of the current GMWDD Dealer Net plus 30% of all parts required for the repair.

***The $1.42 in the "Net Amount Column" represents the material allowance for engine oil used in comjunction with all labor operations except V2790.

Dealers will automatically receive the correct labor allowance based on the labor operation performed.

Refer to the Chevrolet Claims Processing Manual for details on Product Campaign Claim submission.

In addition to the normal dealer claim information, a "Claim Information Chart," has been prepared on page 10 to assist Dealer personnel in identifying the repair categories of each vehicle involved.

Campaign Identification Label

CAMPAIGN IDENTIFICATION LABEL

Each vehicle modified in accordance with the instructions outlined in this Product Campaign Bulletin will require a "Campaign Identification Label." Each label provides a space to include the five digit dealer code of the dealer performing the campaign service. This information may be inserted with a typewriter or ballpoint pen.

Each "Campaign Identification Label" is to be located on the radiator core support in an area which will be visible when the vehicle is brought in for periodic servicing by the owner.

Apply "Campaign Identification Label" only on a clean dry surface.

Administrative Procedure

REFER TO THE CURRENT CHEVROLET SERVICE POLICIES AND PROCEDURES MANUAL AND CLAIMS PROCESSING MANUAL FOR CAMPAIGN HANDLING AND ADMINISTRATIVE PROCEDURES.

(Notification Used By Chevrolet Motor Division)

Dear Chevrolet Truck Owner:

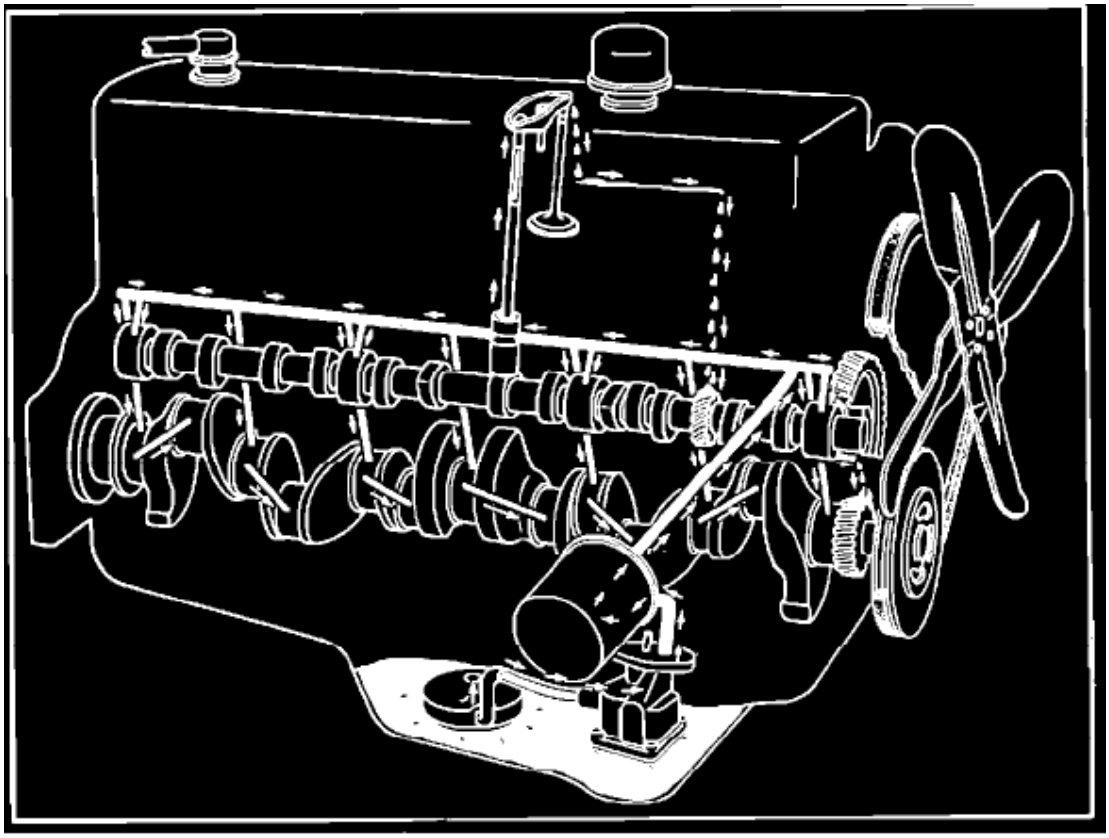
General Motors has determined that some 1985 C/K/G/P Light Duty trucks equipped with a gasoline engine or a 6.2L diesel engine that has an engine oil cooler, RPO KC4, may experience failure of the engine oil cooler hose/hoses. During normal operation, the hoses may burst, resulting in a rapid engine oil loss which could result in internal engine damage.

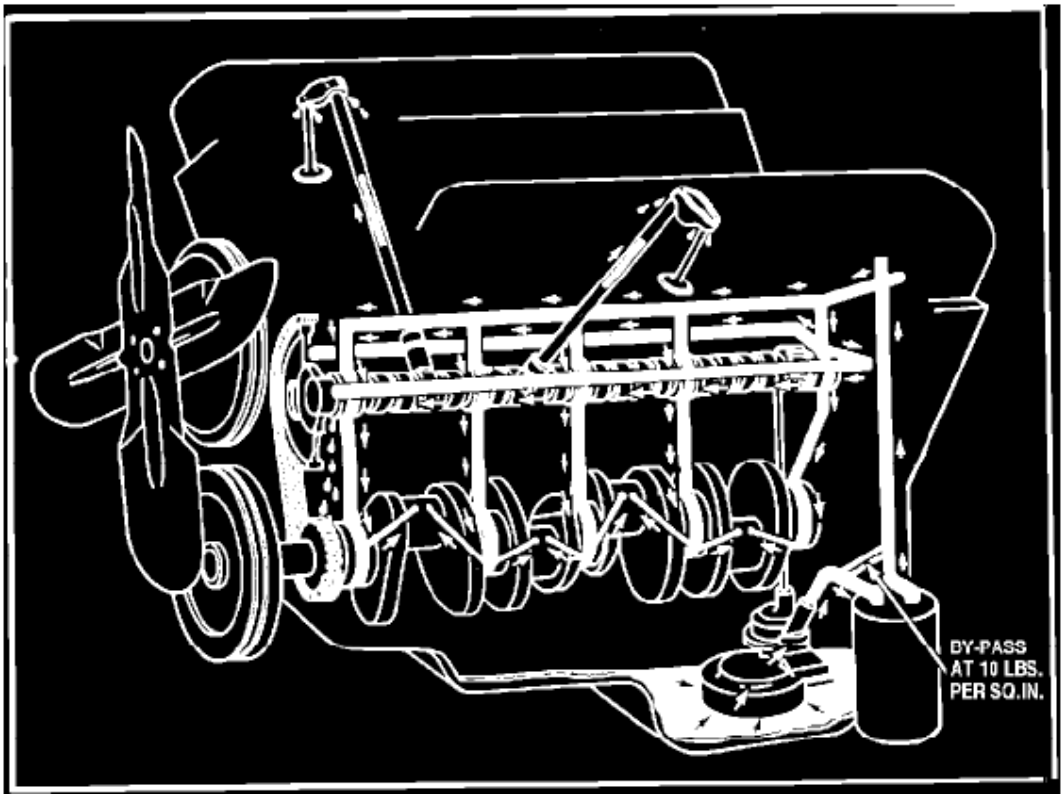
To prevent the possibility of this condition occurring on your vehicle, please contact your Chevrolet Dealer on or after the date shown below to arrange for a service date. Your dealer will inspect the oil cooler lines and replace them if necessary. This service will be completed at no charge to you.

Instructions have been sent to your Chevrolet dealer. It is estimated that parts will be available August 23, 1985. The labor time to inspect your vehicle is about 10 minutes. If it is necessary to replace the oil cooler lines, it will take approximately one (1) hour longer. Please ask your dealer if you wish to know how much additional time will be needed to process your vehicle.

The enclosed Owner Reply Card identifies your vehicle. Presentation of this card to your dealer will assist them in making the necessary correction to your vehicle in the shortest possible time. If you have sold or traded your vehicle, please let us know by completing the postage paid owner reply card and returning it to us.

We are sorry to cause you this inconvenience; however, we have taken this action in the interest of your continued satisfaction with our products.

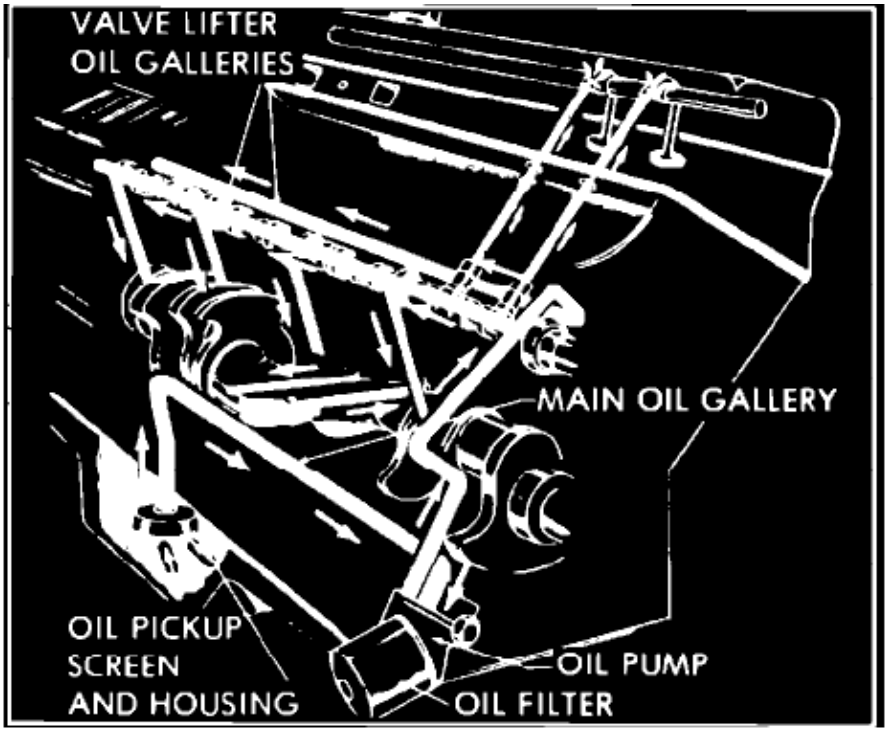


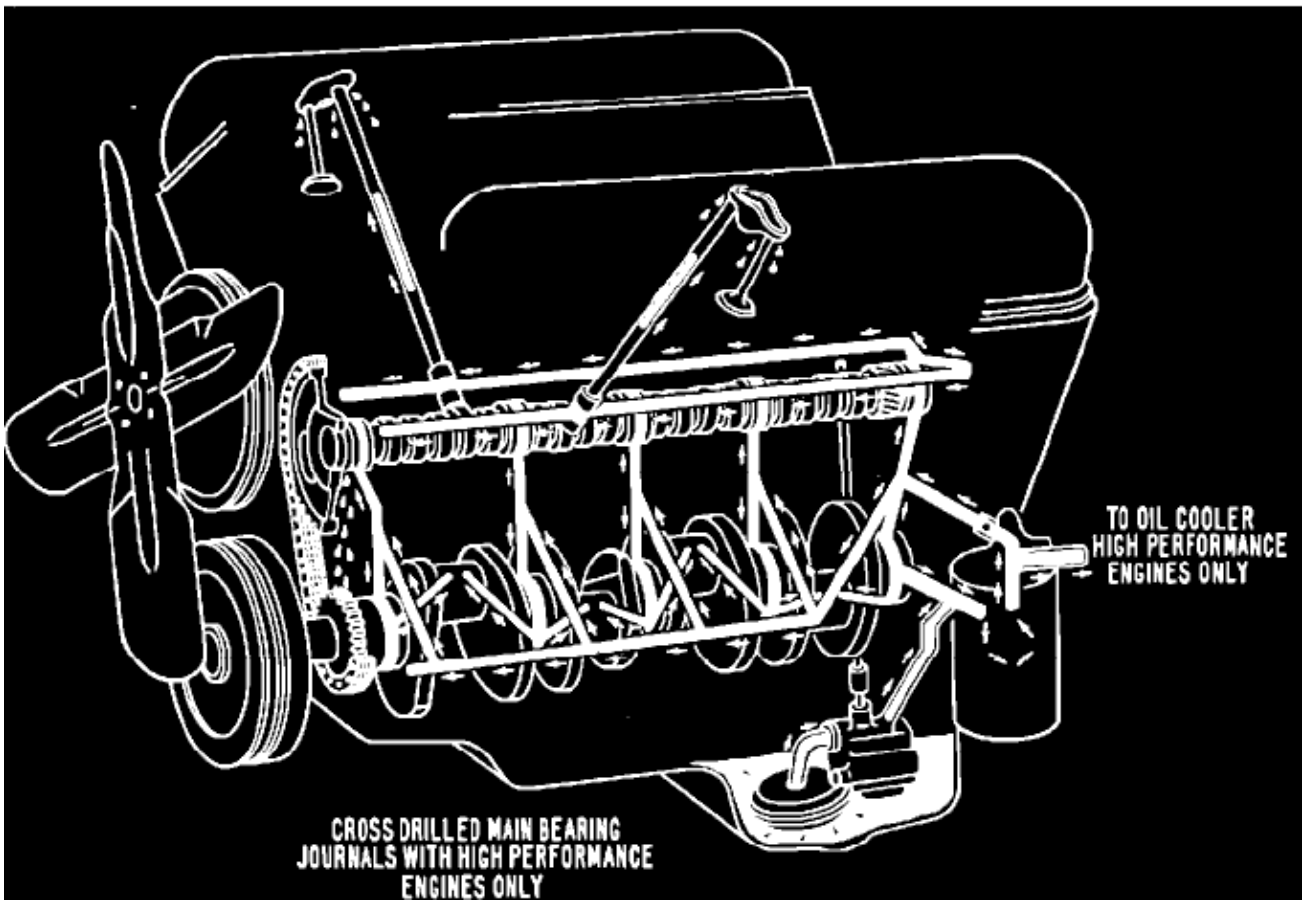

BY-PASS
AT 10 LBS.
PER SQ.IN.

Oil Pan: Service and Repair

Engine oiling system. 6-250 & 292

Engine oiling system. V8-267, 305, 350 & 400


VALVE LIFTER
OIL GALLERIES
MAIN OIL GALLERY
OIL PICKUP
SCREEN
AND HOUSING
OIL PUMP
OIL FILTER


TO OIL COOLER
HIGH PERFORMANCE
ENGINES ONLY
CROSS DRILLED MAIN BEARING
JOURNALS WITH HIGH PERFORMANCE
ENGINES ONLY

Engine oiling system. V8-454

Engine oiling system. V6-231

V6-229, 262, V8-267, 305, 350 & 400

1985---87 Late production 1985 and all 1986---87 models with V6-262 engines are equipped with a one-piece oil pan gasket that replaces the four-piece gasket previously used. The one-piece gasket (P/N14081222) can be installed on all V6-262 engines and should be used during installation whenever the oil pan is removed.

Series 10---30/1500---3500

1. Disconnect battery ground cable and drain oil pan.

2. Raise and support vehicle, then remove exhaust crossover pipe.

3. On vehicles equipped with automatic transmission, remove converter housing under pan.

4. If equipped with V6 engine, remove strut rods at flywheel cover, then remove starter.

5. On K and V models with automatic transmission, remove strut rods at motor mounts.

6. Remove oil pan attaching bolts, then the oil pan.

7. Reverse procedure to install.

Oil Pressure Sender: Specifications

Oil Pressure Switch 10 ft.lb

Oil Pressure Warning Lamp/Indicator: Testing and Inspection

Many trucks utilize a warning light on the instrument panel in place of the conventional dash indicating gauge to warn the driver when the oil pressure is dangerously low. The warning light is wired in series with the ignition switch and the engine unit--which is an oil pressure switch. The oil pressure switch contains a diaphragm and a set of contacts. When the ignition switch is turned on, the warning light circuit is energized and the circuit is completed through the closed contacts in the pressure switch. When the engine is started, build-up of oil pressure compresses the diaphragm, opening the contacts, thereby breaking the circuit and putting out the light.

TROUBLESHOOTING On some models, the oil pressure indicator light also serves as the electric choke defect indicator. If Oil or ENG. indicator light does not light, check to ensure electric choke is not disconnected at carburetor. Also check for defect in electric choke heater, blown gauge fuse or defect in lamp or wiring circuit. If indicator light stays on with engine running possible causes are: oil pressure is low, switch to indicator light wiring has an open circuit, oil pressure switch wire connector has disconnected or on some models, gauge or radio fuse has blown.

The oil pressure warning light should go on when the ignition is turned on. If it does not light, disconnect the wire from the engine unit and ground the wire to the frame or cylinder block. Then if the warning light still does not go on with the ignition switch on, replace the bulb. If the warning light goes on when the wire is grounded to the frame or cylinder block, the engine unit should be checked for being loose or poorly grounded. If the unit is found to be tight and properly grounded, it should be removed and a new one installed. (The presence of sealing compound on the threads of the engine unit will cause a poor ground.) If the warning light remains lit when it normally should be out, replace the engine unit before proceeding further to determine the cause for a low pressure indication. The warning light will sometimes light up or flicker when the engine is idling, even though the oil pressure is adequate. However, the light should go out when the engine speed is increased.

Engine Oil Pressure: Specifications

Normal Oil Pressure 30-45 psi

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Intake Manifold: Technical Service Bulletins Engine - Intake Manifold Inspection/Replacement

INFORMATION

Bulletin No.: 00-06-01-026C

Date: February 03, 2010

Subject: Intake Manifold Inspection/Replacement After Severe Internal Engine Damage

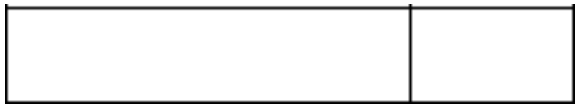
Models:

2010 and Prior Passenger Cars and Trucks (Including Saturn) 2010 and Prior HUMMER H2, H3 2009 and Prior Saab 9-7X

Supercede: This bulletin is being revised to include additional model years. Please discard Corporate Bulletin Number 00-06-01-026B (Section 06 - Engine).

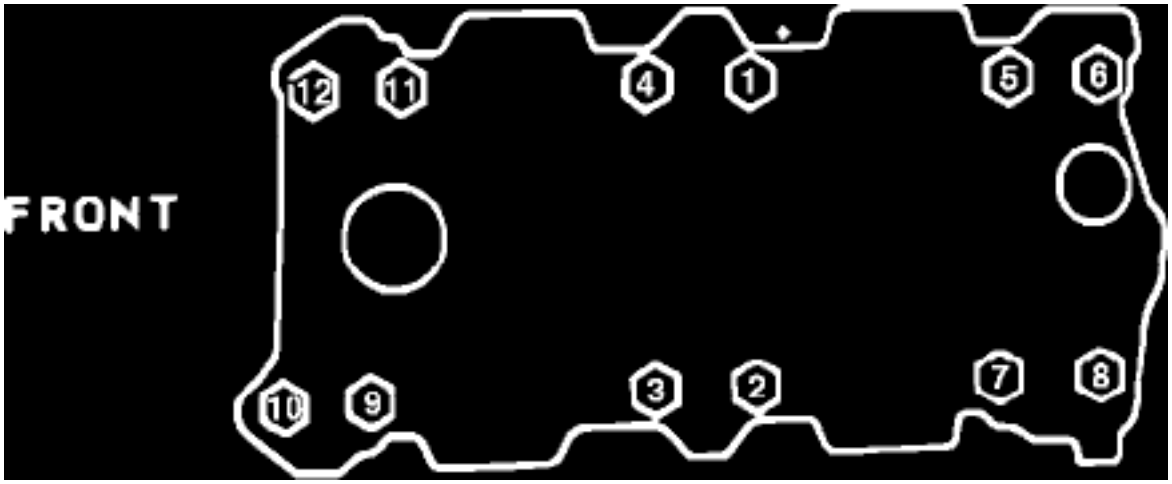
When replacing an engine due to internal damage, extreme care should be taken when transferring the intake manifold to the new Goodwrench service engine long block. Internal damage may result in the potential discharge of internal engine component debris in the intake manifold via broken pistons and/or bent, broken, or missing intake valves. After removing the intake manifold from the engine, the technician should carefully inspect all of the cylinder head intake ports to see if the valve heads are still present and not bent. Usually when the valve heads are missing or sufficiently bent, internal engine component debris will be present to varying degrees in the intake port of the cylinder head. If this debris is present in any of the cylinder head intake ports, the intake manifold should be replaced. This replacement is required due to the complex inlet runner and plenum configuration of most of the intake manifolds, making thorough and complete component cleaning difficult and nearly impossible to verify complete removal of debris. Re-installation of an intake manifold removed from an engine with deposits of internal engine component debris may result in the ingestion of any remaining debris into the new Goodwrench service engine. This may cause damage or potential failure of the new service engine.

Disclaimer



Intake Manifold: Specifications

Manifold Bolt Torque 30 ft.lb



Intake Manifold: Service and Repair

Fig.11 Intake Manifold Tightening Sequence V8-267, 305, 350, 400

Series 10---30/1500---3500

1. Disconnect battery ground cable, then drain cooling system.

2. Remove air cleaner.

3. On G models, remove engine cover.

4. Remove AIR crossover hose, if applicable.

5. Disconnect heater and radiator hoses, then remove upper alternator bracket.

6. Disconnect all vacuum hoses and electrical connections that will interfere with manifold removal.

7. Disconnect fuel line, linkage and cables from carburetor or TBI unit.

8. Remove spark plug wires, if necessary.

9. Remove distributor.

10. On all except G models with fuel injected engine, if equipped with A/C, remove compressor and bracket and position aside.

11. On fuel injected models, disconnect ignition coil wires, then remove emission control sensors and bracket on right side. Remove cruise control transducer and bracket, then the fuel line bracket at rear of manifold. On G models, remove bracket at rear of belt idler.

12. On all models, remove carburetor or TBI unit, if necessary.

13. Remove intake manifold attaching bolts, then the intake manifold.

14. Reverse procedure to install, using new gaskets and seals. Coat front and rear ridges of cylinder case with a 3/16 inch bead of RTV sealant. Extend bead 1/2 inch up each cylinder head to retain side gaskets, then seal around all water passages. Torque manifold bolts to specification in sequence shown in Fig. 11.

Oil Level Warning Indicator: Description and Operation

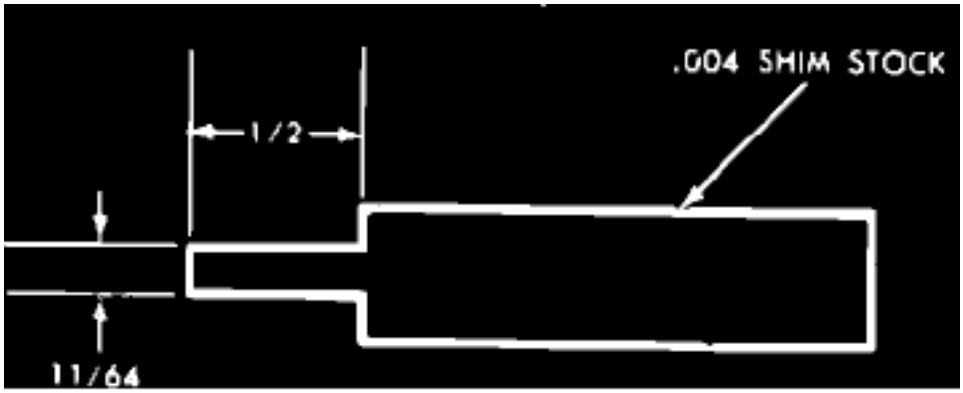
On models less gauges, the oil/choke warning indicator lamp should be illuminated when the ignition switch is in the Run or Start position. When the engine is started, the choke warning indicator lamp should go off. If the lamp fails to illuminate with ignition switch in Run or Start position with engine not operating, a burnt out bulb or fuse or defect in choke electrical system is indicated. If lamp remains on after engine has been started, a problem in the engine oil pressure system or electrical choke system exist. On models equipped with gauges, the choke warning indicator lamp should be illuminated when the ignition switch is in the Run or Start position. When the engine is started, the choke warning indicator lamp should go off. If fails to illuminate with ignition switch in Run or Start position with engine not operating, a burnt out bulb or fuse or defect in choke electrical system is indicated. If lamp remains on after engine has been started, a problem in the alternator circuit is indicated. After service has been completed, the lamp operation should return to normal.

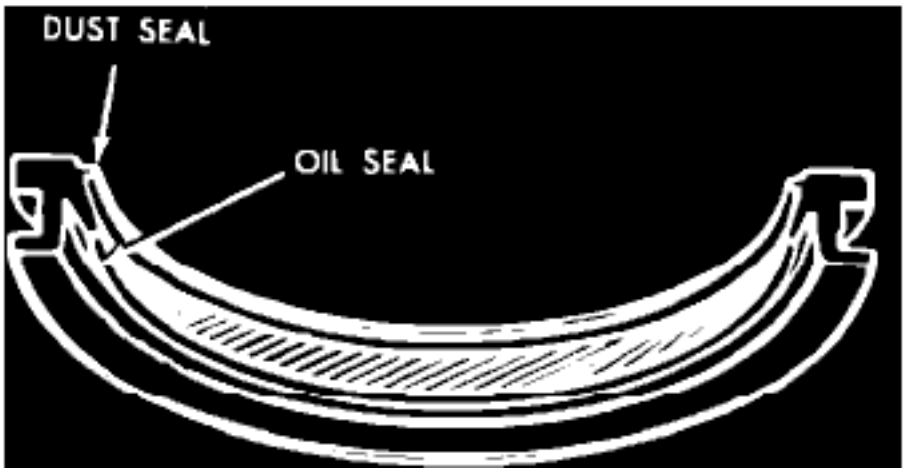
Oil Pressure Warning Lamp/Indicator: Testing and Inspection

Many trucks utilize a warning light on the instrument panel in place of the conventional dash indicating gauge to warn the driver when the oil pressure is dangerously low. The warning light is wired in series with the ignition switch and the engine unit--which is an oil pressure switch. The oil pressure switch contains a diaphragm and a set of contacts. When the ignition switch is turned on, the warning light circuit is energized and the circuit is completed through the closed contacts in the pressure switch. When the engine is started, build-up of oil pressure compresses the diaphragm, opening the contacts, thereby breaking the circuit and putting out the light.

TROUBLESHOOTING On some models, the oil pressure indicator light also serves as the electric choke defect indicator. If Oil or ENG. indicator light does not light, check to ensure electric choke is not disconnected at carburetor. Also check for defect in electric choke heater, blown gauge fuse or defect in lamp or wiring circuit. If indicator light stays on with engine running possible causes are: oil pressure is low, switch to indicator light wiring has an open circuit, oil pressure switch wire connector has disconnected or on some models, gauge or radio fuse has blown.

The oil pressure warning light should go on when the ignition is turned on. If it does not light, disconnect the wire from the engine unit and ground the wire to the frame or cylinder block. Then if the warning light still does not go on with the ignition switch on, replace the bulb. If the warning light goes on when the wire is grounded to the frame or cylinder block, the engine unit should be checked for being loose or poorly grounded. If the unit is found to be tight and properly grounded, it should be removed and a new one installed. (The presence of sealing compound on the threads of the engine unit will cause a poor ground.) If the warning light remains lit when it normally should be out, replace the engine unit before proceeding further to determine the cause for a low pressure indication. The warning light will sometimes light up or flicker when the engine is idling, even though the oil pressure is adequate. However, the light should go out when the engine speed is increased.





Crankshaft Main Bearing Seal: Service and Repair

Fig. 43 Fabricated seal starting tool for helix type seal.

Fig. 44 Crankshaft rear oil seal. Helix type

EXC. V6-231 & 1986---87 V6-262, V8-305 & V8-350 These engines are equipped with a two-piece, helix type rear seal. A seal starting tool, Fig. 43, must be used to prevent the upper seal half from coming into contact with the sharp edge of the block. When necessary to correct an oil leak due to a defective seal, always replace the upper and lower seal halves as a unit, Fig. 44. When installing either half, lubricate the lip portion only with engine oil, keeping oil off the parting line surface as this is treated with glue. Always clean crankshaft surface before installing a new seal.

1. To replace the lower seal, remove seal from groove in bearing cap, using a small screwdriver.

2. Insert new seal and roll it in place with finger and thumb.

3. To replace the upper seal (with engine in car) use a small hammer and tap a brass pin punch on one end of the seal until it protrudes far enough to be removed with pliers.

4. Position tip of tool, Fig. 43, between crankshaft and seal seat in cylinder block.

5. Position seal between crankshaft and tip of tool with seal bead contacting tip of tool. Ensure oil seal lip is facing toward front of engine.

6. Roll seal around crankshaft, using tool as a ``shoehorn'' to protect seal bead from sharp corner of seal seat surface in cylinder block. Tool must remain in position until seal is properly seated with both ends flush with block.

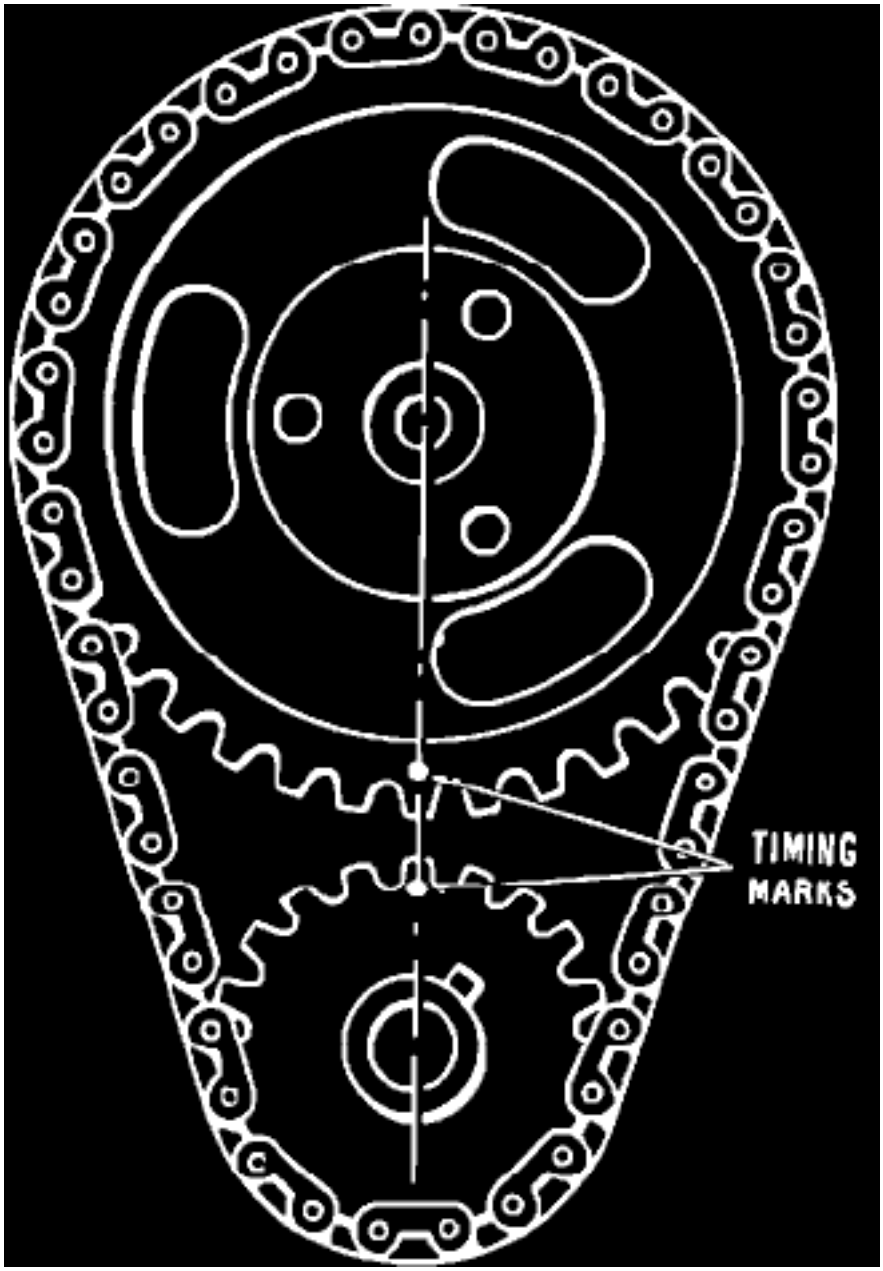
7. Remove tool, using care not to dislodge seal.

8. Install new seal into bearing cap with tool as outlined previously.

9. Install bearing cap with sealant applied to the cap to case interface. Do not apply sealant to seal ends. Torque rear main bearing cap bolts to specifications as listed in the ``Engine Tightening Specification Chart.''

Oil Pressure Sender: Specifications

Oil Pressure Switch 10 ft.lb



Timing Chain: Service and Repair

Fig. 34 Valve timing marks. V6-229, 262, V8-267, 305, 350, 400 & 454

V6-229, 262, V8-267, 305, 350, 400 & 454

1. Remove timing case cover as outlined previously.

2. Remove crankshaft oil slinger.

3. Crank engine until "O" marks on sprockets are in alignment, Fig. 34.

4. Remove three camshaft-to-sprocket bolts.

5. Remove camshaft sprocket and timing chain together. Sprocket is a light press fit on camshaft for approximately 1/8 inch. If sprocket does not come off easily, a light blow with a plastic hammer on the lower edge of the sprocket should dislodge it.

6. If crankshaft sprocket is to be replaced, remove it with a suitable gear puller. Install new sprocket, aligning key and keyway.

7. Install chain onto camshaft sprocket. Hold sprocket with chain hanging vertically, then align marks on sprockets as shown, Fig. 34. The valve timing marks shown in Fig. 34, do not indicate TDC compression stroke for No. 1 cylinder, which is used during distributor installation. If distributor was removed, install timing chain and sprockets, aligning timing marks, Fig. 34, then rotate engine until No. 1 cylinder is on compression and camshaft timing mark is 180° from valve timing position shown in Fig. 34. Install distributor.

8. Align dowel in camshaft with dowel hole in sprocket and install sprocket on camshaft. Do not attempt to drive sprocket on camshaft as welch plug at rear of engine can be dislodged.

9. Draw sprocket onto camshaft, using the three mounting bolts. Tighten to 20 ft. lbs. torque.

10. Lubricate timing chain and install cover.

Timing Cover: Service and Repair

V6-229, 262, V8-267, 305, 350, 400 & 454

1. Remove vibration damper and water pump, then the oil pan, if necessary.

2. Remove cover retaining screws and cover.

3. Clean gasket surface of block and timing case cover.

4. Remove any excess oil pan gasket material that may be protruding at the oil pan to engine block junction.

5. Apply a thin bead of RTV #1052366 sealer or equivalent to the joint formed at oil pan and block.

6. Coat new gasket with sealer and position it on cover, then install cover to oil pan seal on cover and coat bottom of seal with engine oil.

7. Position cover on engine and loosely install the upper bolts.

8. Tighten screws alternately and evenly while pressing downward on cover so that dowels are aligned with holes in cover. Do not force cover over dowels as cover can be distorted.

9. Install remaining cover screws, vibration damper and water pump.

Fuel Pressure: Specifications

Fuel Pressure .... 27.5 to 44.8 kPa (4 to 6.5 psi) Fuel Pump Vacuum .... 50.6 kPa (15 inches Hg)

Fuel Pressure: Testing and Inspection Fuel Pump Flow Test - Fuel Injected

FUEL PUMP FLOW TEST

1. Disconnect the EFI fuel feed line, then connect suitable hose to line and direct end into suitable container.

2. Apply battery voltage to the fuel pump test terminal. The fuel pump should supply 1/2 pint or more fuel within 15 seconds.

3. If fuel flow is below minimum, check for fuel restrictions. If there is no restrictions, check pump vacuum and/or pressure.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Fuel Injected

FUEL PRESSURE TEST

- Turn engine "OFF" and perform Fuel Pressure Relief procedure.

CAUTION: A small amount of fuel may be released, after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Place the cloth in an approved container when disconnect is completed.

- Install fuel pressure gage J-29658A/BT8205, or equivalent, at the outlet side of the in-line fuel filter.

- Start engine and observe fuel pressure reading. It should be 62-90 kPa (9-13 psi).

- Relieve fuel pressure.

- Remove fuel pressure gage.

- Re-install fuel hose or pipe assembly to in-line fuel filter.

- Start engine and check for fuel leaks.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB # 90-6C-89, Dated 9/90

Some 1985-90 engines equipped with 2.5L, 2.8L, 4.3L, 5.0L, 5.7L or 7.4L may experience a condition where fuel delivery is interrupted to the engine causing a "no start condition". This condition may be caused by deterioration of the in-tank fuel pump coupler hose located between the fuel pump sending unit and the fuel pump. This condition may be repaired by replacing the original coupler hose with a new VITON coupler hose kit P/N 25028041. The kit consist of a new VITON hose and two clamps.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Mechanical Fuel Pump

FUEL PUMP PRESSURE TEST

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be (4 to 6.5 psi). 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pressure: Testing and Inspection Fuel Pump Vacuum Test - Mechanical Fuel Pump

FUEL PUMP VACUUM TEST

1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least (15" Hg.). If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.

Fuel Pressure: Testing and Inspection Fuel System Pressure Test - Carbureted

Fuel Pump Flow Test:

1. Connect hose from carburetor fuel feed line to a suitable unbreakable container and crank engine. 2. Fuel pump should supply 1/2 pint or more in 15 seconds. 3. If flow is below minimum, check for fuel restriction. If there is no restriction, check pump pressure and/or vacuum.

Fuel Pump Pressure Test:

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be 4 to 6.5 psi. 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pump Vacuum Test:

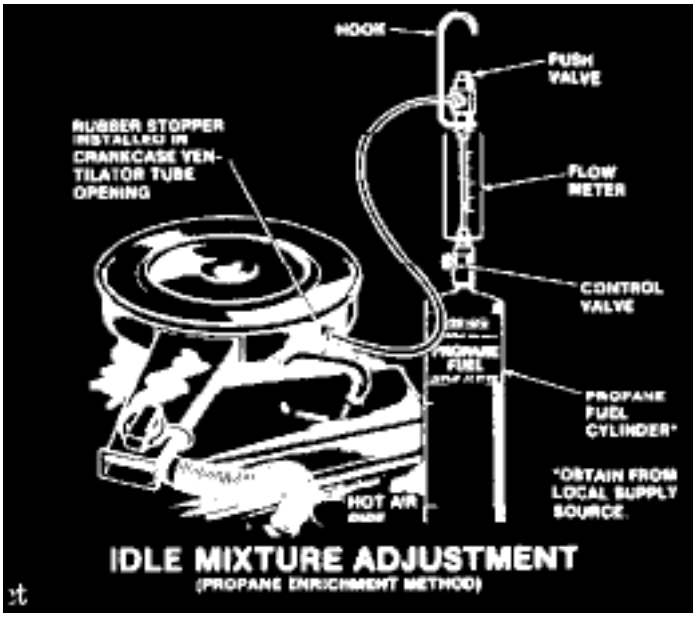
1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least 15" Hg. If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.



Air/Fuel Mixture: Adjustments Federal

Light Duty

NOTE: Vehicles with a Gross Vehicle Weight Rating (GVWR) below 6000 lbs (8500 lbs for California), and passenger carrying vehicles with a capacity of 12 persons or less, are Light Duty Emissions Vehicles.

NOTE: Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement or high emissions as determined by official inspections. Adjusting mixture by other than the following method may violate Federal and or California or other state or Provincial laws. Because of the sealed idle mixture needles, the idle mixture checking procedure requires artificial enrichment by adding propane.

1. Set parking brake and block drive wheel. Engine must be at normal operating temperature and air conditioning off. 2. Disconnect and plug EGR and cannister purge vacuum hoses. 3. Connect an accurate tachometer to engine. 4. Disconnect vacuum advance and set timing to specification. Reconnect vacuum hose. See: Ignition Timing 5. Set carburetor idle speed to specification. See: Powertrain Management/Fuel Delivery and Air Induction/Adjustments 6. Disconnect crankcase ventilation tube from air cleaner.

Fig. 61 - Propane Enrichment Tool Installation

7. Using tool J-26911, insert hose with rubber stopper, from propane valve into crankcase ventilation tube opening in air cleaner. Propane cartridge

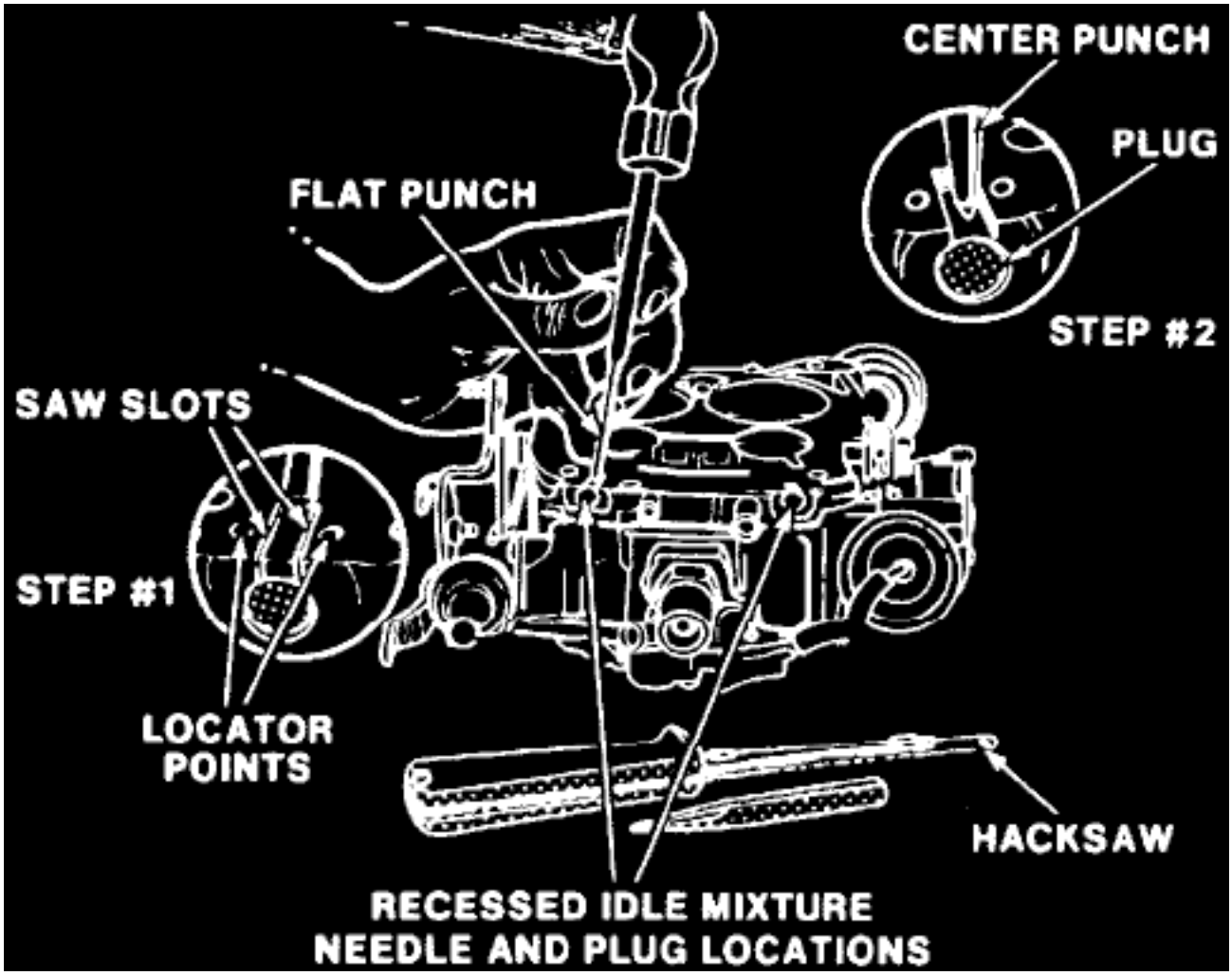
must be vertical.

8. With engine idling in drive (neutral for manual shifts) slowly open propane control valve while pressing button. Continue to add propane until

speed drops due to over richness. Note maximum engine speed (enriched speed).

9. If the enriched idle speed is within the enriched idle specification the mixture is correct. Go to step 17.

Enrichment Specification: See: Idle Speed/Specifications



10. If the enriched idle speed is not within specification, remove mixture screw plugs as follows:

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.

11. Using tool J29030 or equivalent, lightly seat mixture needles, then back out equally, just enough so engine will run. 12. Place transmission in drive (automatic) or neutral (manual). 13. Back each screw out (richen 1/8 turn at a time until maximum idle speed is obtained). Then using base idle speed adjustment screw, set idle speed

to the enriched idle specification. See: Idle Speed/Specifications

14. Turn each mixture screw in (clockwise) 1/8 turn at a time until idle speed reaches base idle speed. 15. Re-check enriched speed with propane. If not within specification, repeat adjustment beginning with step 12. 16. After adjustments are complete, seal the idle mixture needle setting using silicone sealant or equivalent. The sealer is required to prevent

tampering with the setting and to prevent the possibility of loss of fuel vapors.

17. Check and adjust fast idle speed. See: Powertrain Management/Fuel Delivery and Air Induction/Adjustments 18. Turn off engine. Remove propane tool, connect crankcase ventilation tube. Unplug and reconnect vacuum hoses. Install air cleaner.

Heavy Duty

NOTES:

- Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement, or high emissions as determined by official inspections.

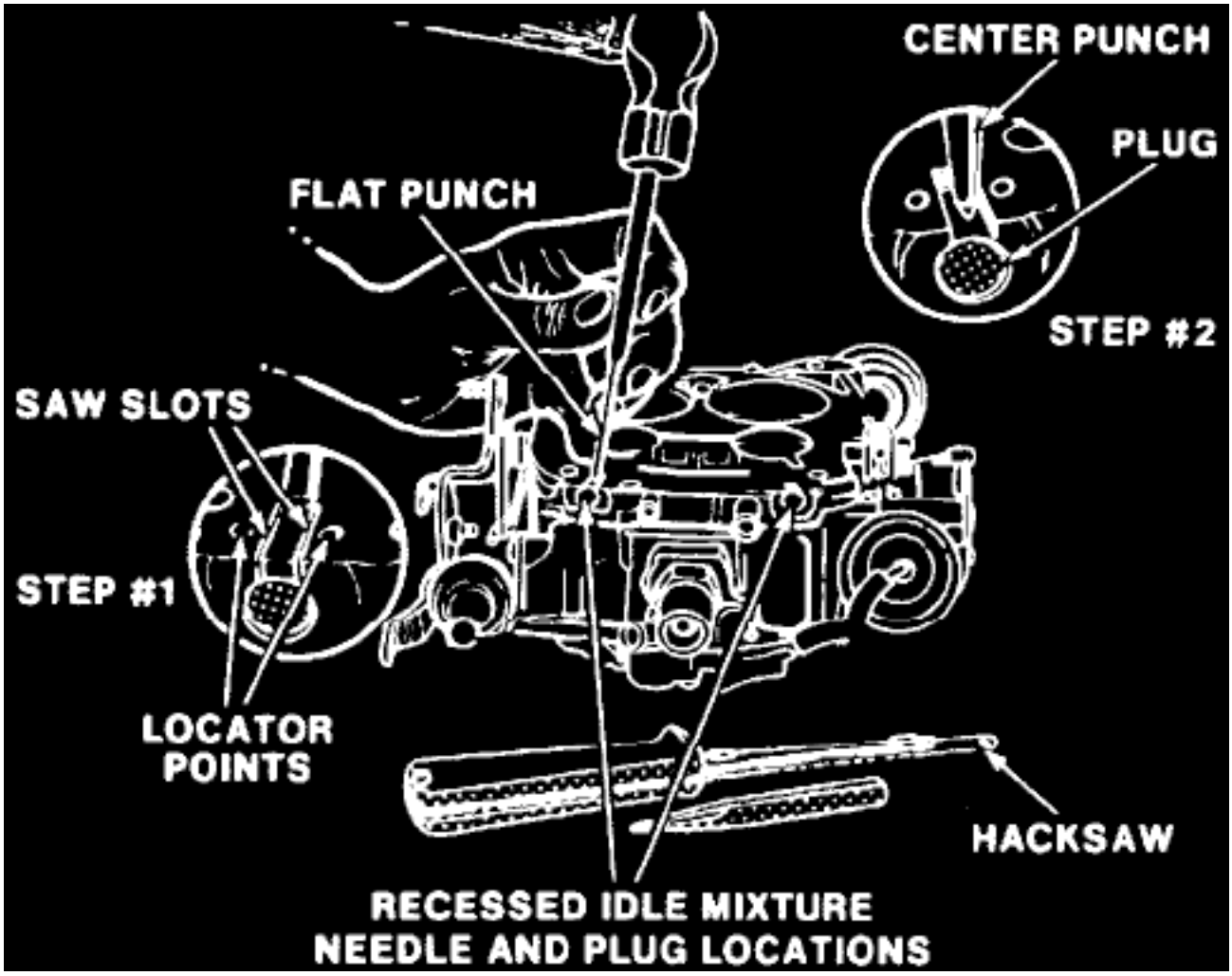
- If necessary, remove idle needle plugs:

- Perform this adjustment with engine at operating temperature, parking brake applied, drive wheels blocked and transmission in park or neutral.

ADJUSTMENT PROCEDURE

1. Remove air cleaner. 2. Connect tachometer and vacuum gage to engine. 3. As a preliminary adjustment, turn idle mixture needles in lightly to seat and back out 2 turns.

NOTE: Do not turn idle mixture needle tightly against seat or damage may result.



4. With engine running (choke wide open and transmission in neutral) adjust idle speed screw to curb idle speed. See: Idle Speed/Adjustments/Idle

Speed

5. Adjust each idle mixture needle to obtain highest RPM. 6. Repeat steps 4 and 5 until "best" idle is obtained. 7. If necessary, reset curb idle speed. See: Idle Speed/Adjustments/Idle Speed/Federal 8. After adjustments are complete, seal the idle mixture needle setting using silicone sealant or equivalent. 9. Check and if necessary, adjust throttle lever actuator.See: Idle Speed/Adjustments/Idle Speed

10. Check and if necessary, adjust fast idle speed. See: Idle Speed/Adjustments/Fast Idle Speed 11. Turn off engine, remove gages, unplug and reconnect vacuum hoses. Install air cleaner. 12. Remove block from drive wheel.

CONCEALMENT PLUG REMOVAL

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

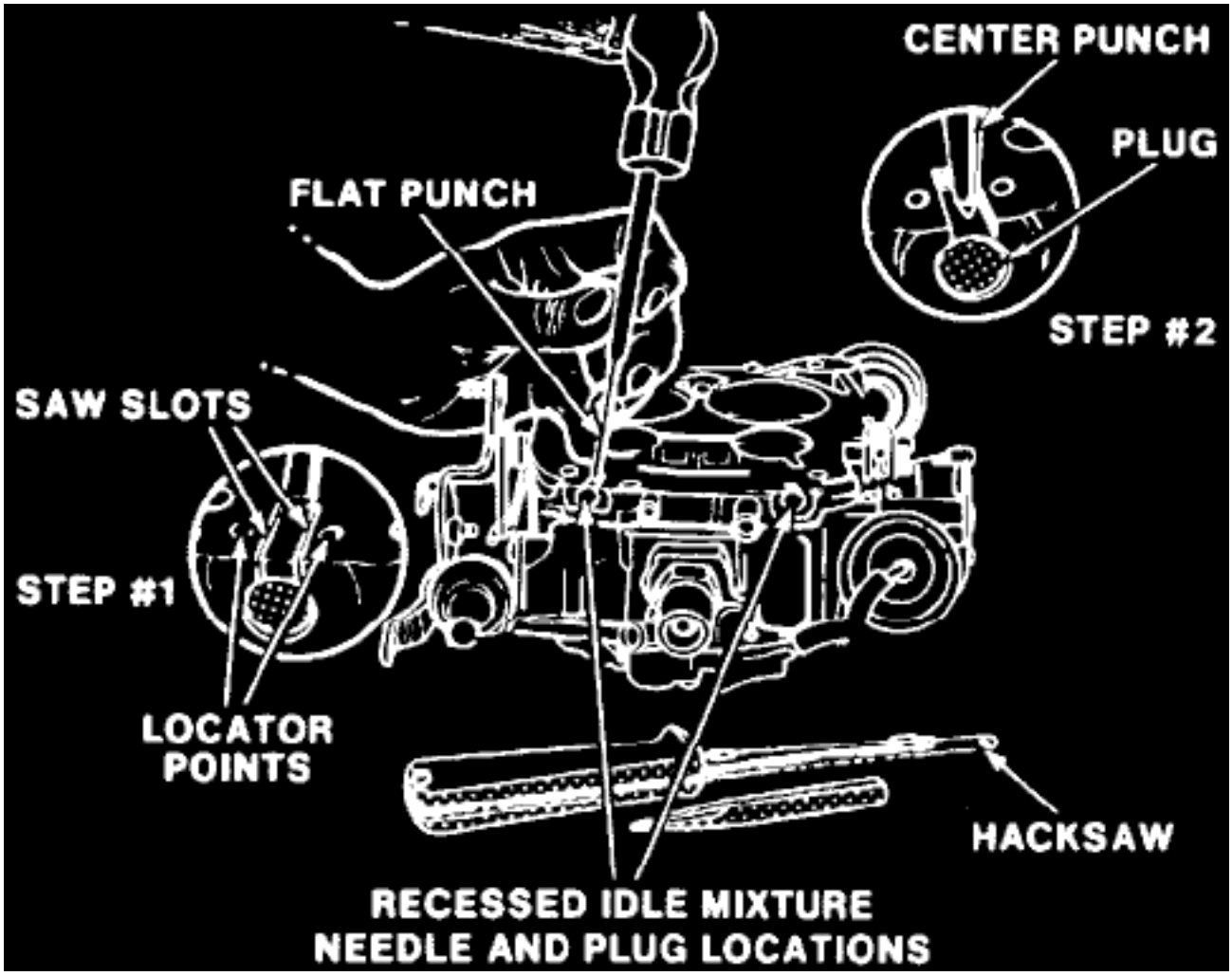
- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.



Air/Fuel Mixture: Adjustments California

IDLE MIXTURE NEEDLES ADJUSTMENT

1. Remove concealment plugs if necessary:

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.

NOTE: Always use a new carburetor base gasket.

2. Using tool J030930, BT-7610-B, or equivalent, remove both idle mixture needles and springs for inspection:

- Needles must not be bent, burred or otherwise damaged.

- Inspect both idle needle openings in the throttle body for any damage or foreign material. Clean as necessary.

3. Install idle mixture needles and springs:

- Turn both mixture needles clockwise until lightly seated.

- Turn each mixture needle counter clockwise 3 turns.

4. Disconnect vacuum hose to canister purge valve and plug it. 5. Place a spacer (0.75 to 0.10 inches) between accelerator pump lever and Throttle Position Sensor (TPS) plunger. 6. Connect dwell meter to Mixture Control (M/C) solenoid dwell lead. This is a green connection breaking out of the main wiring harness leading to

carburetor.

NOTE: Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested

7. Start engine and allow it to reach normal operating temperature. 8. While idling in "DRIVE" (NEUTRAL for manual transmission) adjust both mixture needles equally, in 1/8 turn increments, until dwell reading

varies within the 25-35° range, attempting to be as close to 30° as possible.

NOTE: If reading is too high, turn mixture needles clockwise. If reading is too low, turn mixture needles counterclockwise. Allow time for dwell reading to stabilize after each adjustment.

9. After adjustments are complete, seal the idle mixture needle opening in the throttle body, using silicone sealant or equivalent.

10. Check and adjust idle speed.

Idle Speed: Specifications Enriched Idle Speed

ENRICHED IDLE SPEED

Carburetor Number

17085206 ..... 20 17085208 10
17085209 ..... 50 17085210 10
17085211 50

17085220 ..... 75 17085221 75
17085222 ..... 20 17085223 50
17085224 20

17085225 ..... 50 17085226 20
17085227 ..... 20 17085228 30
17085229 30

17085230 ..... 20 17085231 40
17085235 ..... 80 17085239 75
17085283 75

17085284 ..... 20 17085285 20
17085290 ..... 30 17085291 100
17085292 ..... 30 17085293 100

NOTE: Enriched Idle Speed value is added to base idle speed. This value is used during the idle mixture adjustment procedure.

Idle Speed: Specifications Idle Speed

CURB IDLE SPEED

Light Duty

Manual ..... 700 rpm Automatic ..... 550 rpm (High Altitude 600)

Heavy Duty

Manual ..... 600 rpm Automatic ..... 700 rpm

A/C ON IDLE SPEED

Manual ..... 800 rpm Automatic ..... 650 rpm

FAST IDLE SPEED

Light Duty

Manual ..... 1300 rpm Automatic

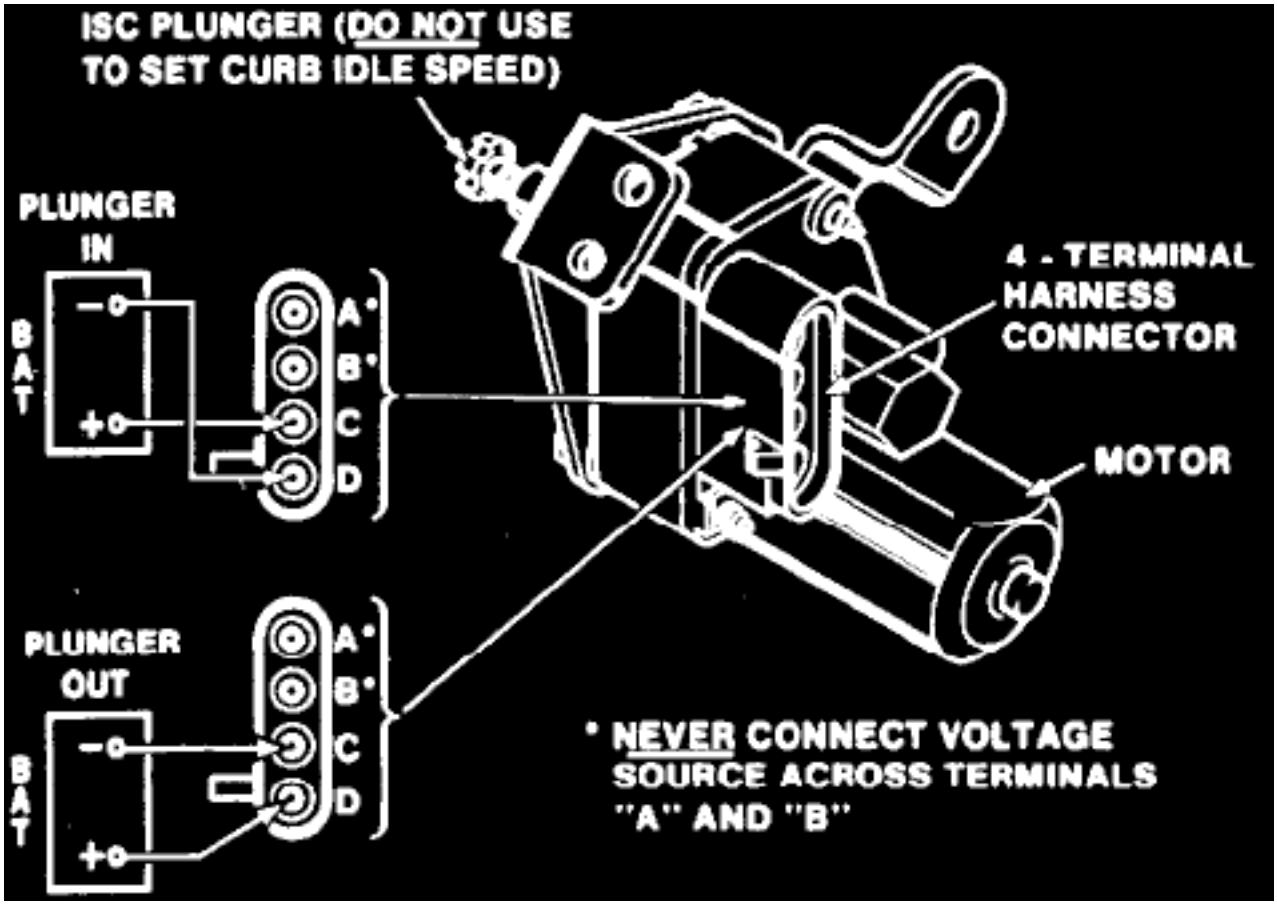
Federal ..... 1600 rpm California ..... 1800 rpm

High Altitude ..... 1400 rpm

Heavy Duty

Automatic/Manual ..... 1900 rpm

NOTE: All fast idle speeds are measured with the fast idle cam on the high step.



Idle Speed: Adjustments Idle Speed

California

NOTE: On engines equipped with an Idle Speed Control (ISC) motor, idle speed is controlled by an electrical signal from the Electronic Control Module (ECM). Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows.

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures:

- Check and adjust ignition timing.

- Disconnect and plug vacuum lines for evaporative purge and EGR valve.

2. Before starting engine, place transmission in "PARK" (automatic) or "NEUTRAL" (manual), set parking brake and block drive wheels. 3. Connect dwell meter to Mixture Control (M/C) solenoid dwell lead. This is a green connection breaking out of the main wiring harness leading to

carburetor.

NOTE: Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF". 5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary). 6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

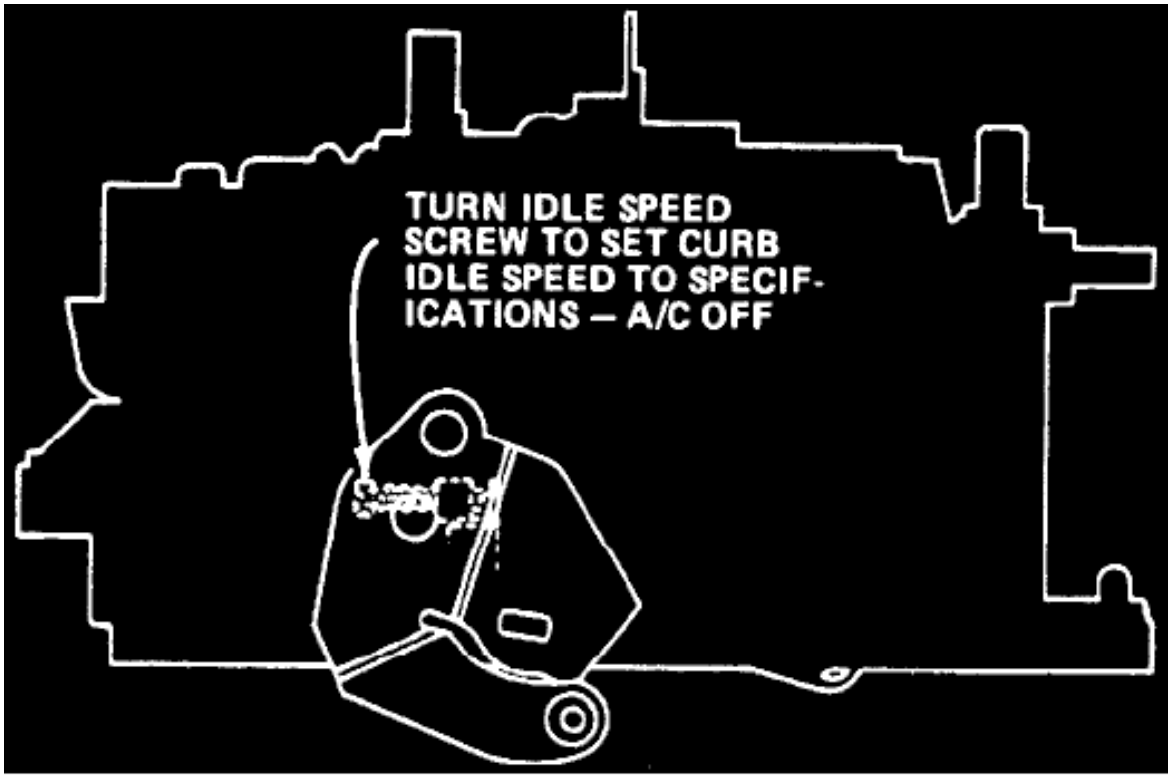
7. Unplug connector from ISC motor.

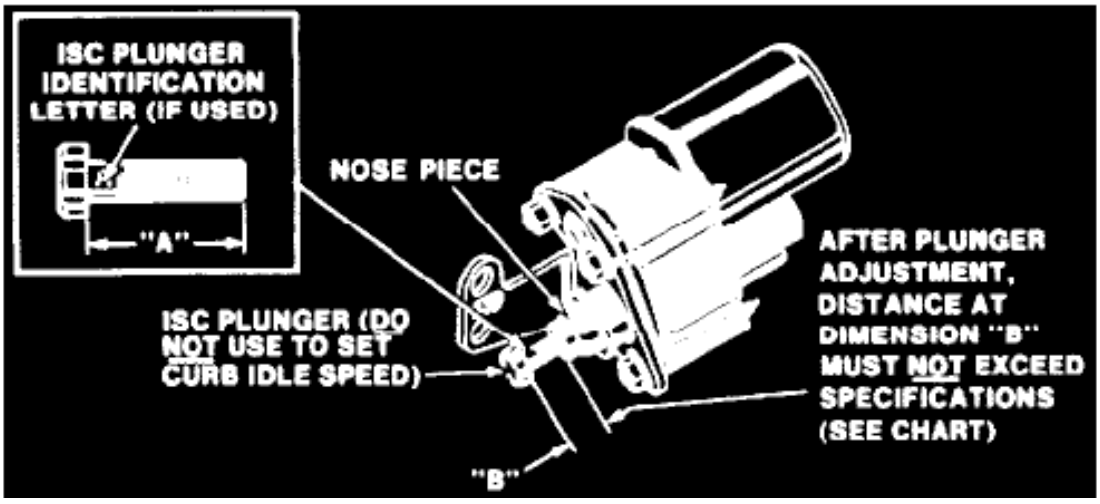
8. Fully retract ISC plunger by applying 12 volts to terminal "C" ad grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place automatic transmission in "DRIVE".


TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIF-ICATIONS – A/C OFF


ISC PLUNGER IDENTIFICATION LETTER (IF USED)
"A"
NOSE PIECE
ISC PLUNGER (DO NOT USE TO SET CURB IDLE SPEED)
"B"
AFTER PLUNGER ADJUSTMENT, DISTANCE AT DIMENSION "B" MUST NOT EXCEED SPECIFICATIONS (SEE CHART)

11. With ISC plunger fully retracted, adjust carburetor base (slow idle stop screw to 470 RPM (minimum authority). 12. Place transmission in "PARK" (automatic transmissions). 13. Fully extend ISC plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC motor connection. Leave power

applied only long enough to extend the plunger.

14. MANUAL TRANSMISSIONS: Using tool J29607 or BT-8022 or equivalent, turn ISC plunger to obtain 900 RPM (Maximum Authority). 15. AUTOMATIC TRANSMISSIONS:

- With transmission in "PARK", using tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

- With parking brake set and drive wheels blocked, place transmission in "DRIVE". Turn ISC plunger to obtain 900 RPM (Maximum Authority).

16. Recheck ISC "Maximum Authority" RPM with voltage applied to ISC motor (step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nosepiece. Dimension "B" must not exceed that shown

in below chart.

IDLE SPEED CONTROL PLUNGER		
IDENTIFICATION LETTER	PLUNGER LENGTH DIMENSION A	AFTER ADJUSTMENT (STEPS 14, 15, or 16), DISTANCE AT DIMENSION "B" MUST NOT EXCEED
NONE	14.1 mm (9/16")	5.6 mm (7/32")
NONE	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/64")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1")	17.1 mm (43/64")
L	27.5 mm (1 3/32")	19.0 mm (3/4")
J	30.0 mm (1 3/16")	21.5 mm (27/32")
N	32.0 mm (1 17/64")	23.5 mm (59/64")
T	34.0 mm (1 11/32")	25.5 mm (1")

18. Fully retract ISC plunger (step 8). Place transmission in "PARK" (automatic) or "NEUTRAL" (manual) and turn ignition "OFF". Disconnect 12

volt power source, ground lead, tachometer and dwell meters. With ignition "OFF" reconnect four terminal harness connector to ISC motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By

restoring the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Federal

PRELIMINARY PROCEDURES

- Warm engine to normal operating temperature (upper radiator hose hot).

- Turn "OFF" all accessories, including A/C.

- Check Timing (adjust if not to specification). See: Ignition Timing

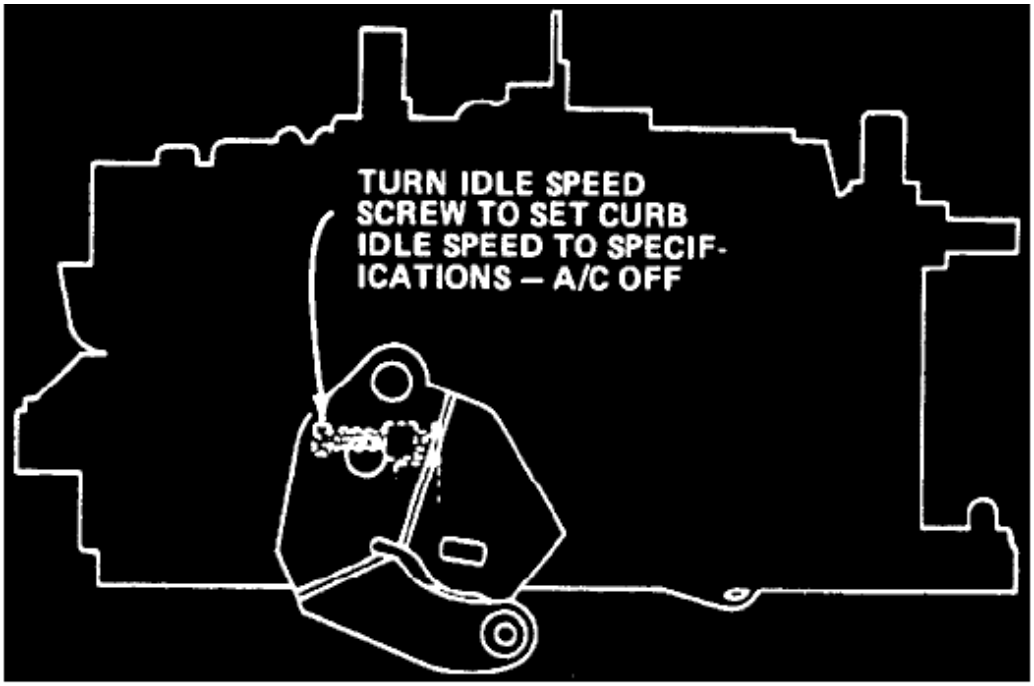
- Connect tachometer.

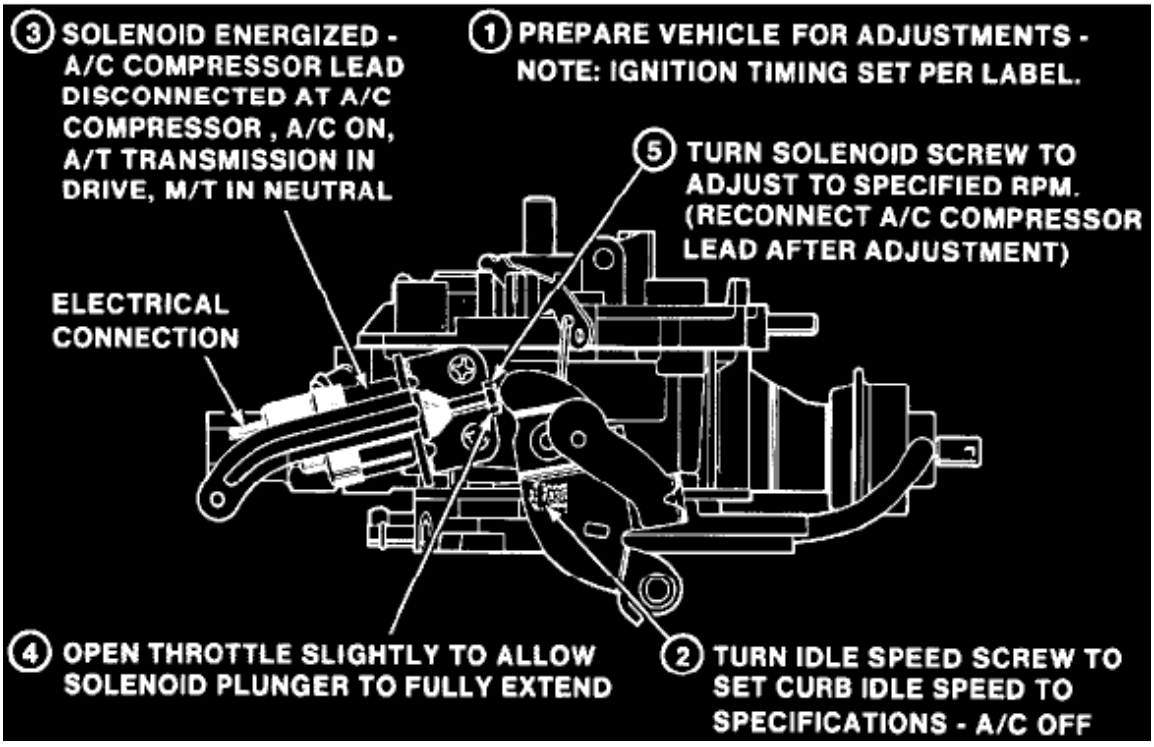
CAUTION: Exercise care not to ground the TACH terminal (which is located next to the BAT connector) as this may damage the Electronic Control Module (ECM) or coil.

CURB IDLE SPEED

- Disconnect and plug vacuum hose to EGR valve and canister purge.

- Adjust curb idle speed.


TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIF-ICATIONS – A/C OFF


3 SOLENOID ENERGIZED - A/C COMPRESSOR LEAD DISCONNECTED AT A/C COMPRESSOR , A/C ON, A/T TRANSMISSION IN DRIVE, M/T IN NEUTRAL
1 PREPARE VEHICLE FOR ADJUSTMENTS - NOTE: IGNITION TIMING SET PER LABEL.
5 TURN SOLENOID SCREW TO ADJUST TO SPECIFIED RPM. (RECONNECT A/C COMPRESSOR LEAD AFTER ADJUSTMENT)
ELECTRICAL CONNECTION
4 OPEN THROTTLE SLIGHTLY TO ALLOW SOLENOID PLUNGER TO FULLY EXTEND
2 TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIFICATIONS - A/C OFF

Without A/C -

Turn idle speed screw to specified curb idle (automatic transmissions in drive with wheels blocked and parking brake set). See: Specifications

With A/C -

With A/C "OFF", turn idle speed screw to specified curb idle (automatic transmissions in drive with wheels blocked and parking brake set).

- Disconnect wire to A/C compressor clutch and turn A/C "ON".

- Open throttle momentarily to assure solenoid plunger is fully extended.

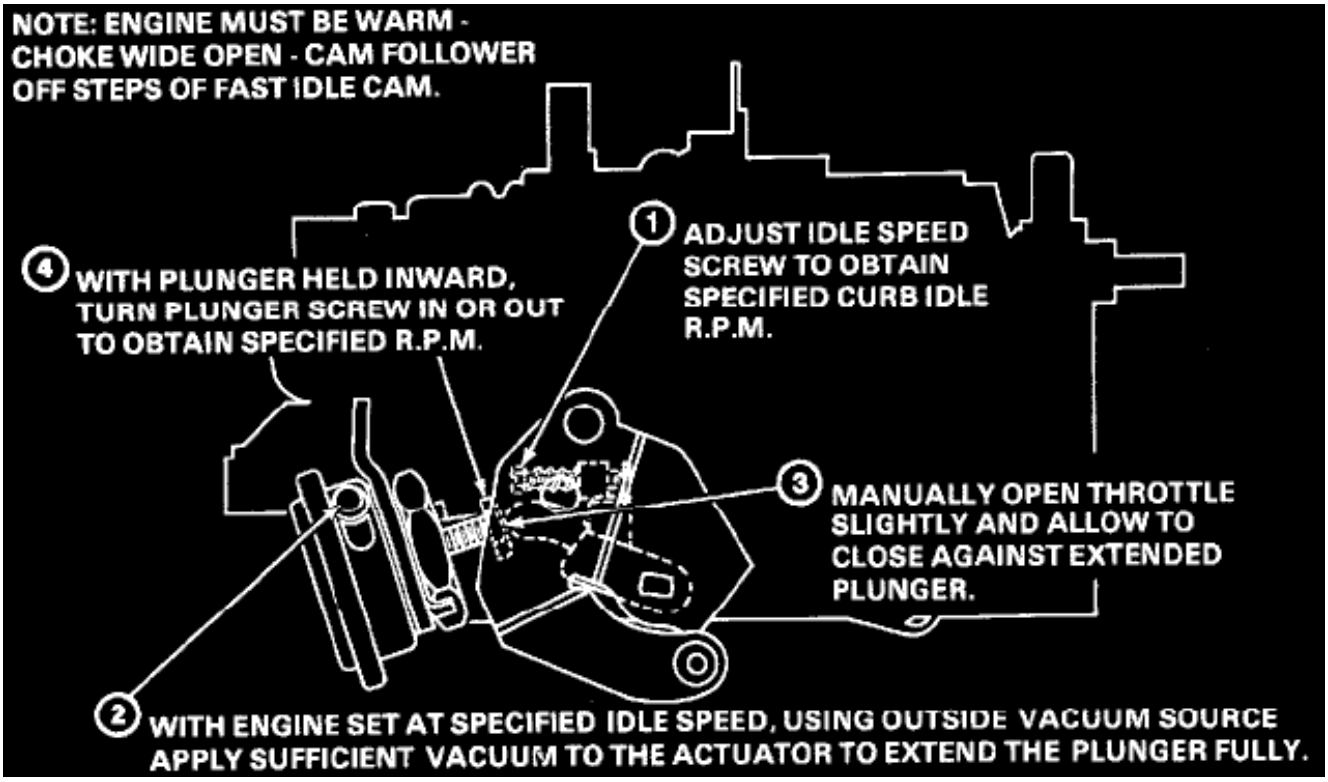
- Turn solenoid screw to the specified idle speed. See: Specifications

- Reconnect wire to compressor clutch.

THROTTLE LEVER ACTUATOR

- Disconnect vacuum hose from solenoid valve to the actuator diaphragm.

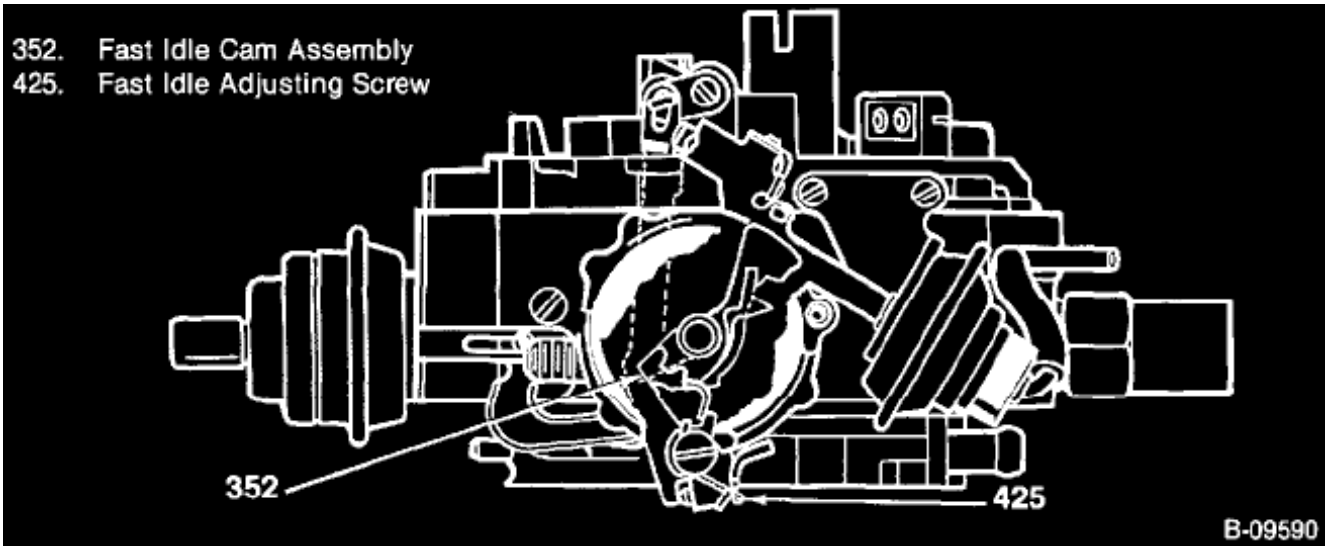
- Connect an external vacuum source to the diaphragm and apply 20 inches of vacuum.



- Manually open the throttle slightly and allow it to close against the extended actuator plunger. With engine warm, idle speed should be:

Federal - 1500 rpm California - 1600 rpm

NOTE: The throttle lever actuator is designed to control emissions by holding the throttle open slightly during deceleration and coasting.



Idle Speed: Adjustments Fast Idle Speed

Carbureted

Fast Idle Adjustment

Check and, if necessary, adjust ignition timing before adjusting fast idle speed. Make all adjustments with engine at normal operating temperature, choke fully open, air cleaner installed and A/C control off, if equipped.

1. Disconnect and plug vacuum hoses as directed on vehicle emission control label.

2. Position fast idle screw on specified step of fast idle cam as directed on vehicle emission control label.

3. Turn fast idle screw in or out and adjust fast idle speed to specifications.

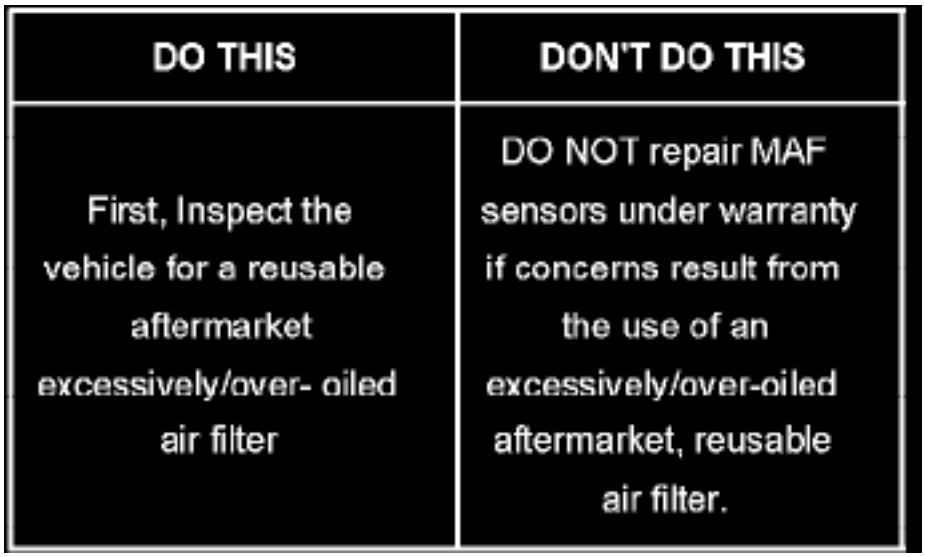
With Carburator Only

Check and, if necessary, adjust ignition timing before adjusting fast idle speed. Make all adjustments with engine at normal operating temperature, choke fully open, air cleaner installed and A/C control off, if equipped.

1. Disconnect and plug vacuum hoses as directed on vehicle emission control label.

2. Position fast idle screw on specified step of fast idle cam as directed on vehicle emission control label.

3. Turn fast idle screw in or out and adjust fast idle speed to specifications.



DO THIS	DON'T DO THIS
First, Inspect the vehicle for a reusable aftermarket excessively/over- oiled air filter	DO NOT repair MAF sensors under warranty if concerns result from the use of an excessively/over-oiled aftermarket, reusable air filter.

Air Filter Element: Customer Interest Engine, A/T - Shift/Driveability Concerns/MIL ON

Bulletin No.: 04-07-30-013B

Date: February 01, 2007

INFORMATION

Subject: Automatic Transmission Shift, Engine Driveability Concerns or Service Engine Soon (SES) Light On as a Result of the Use of an Excessively/Over-Oiled Aftermarket, Reusable Air Filter

Models: 2007 and Prior GM Cars and Light Duty Trucks 2007 and Prior Saturn Models 2003-2007 HUMMER H2 2006-2007 HUMMER H3 2005-2007 Saab 9-7X

Supercede:

This bulletin is being revised to add models and model years. Please discard Corporate Bulletin Number 04-07-30-013A (Section 07 - Transmission/Transaxle).

The use of an excessively/over-oiled aftermarket, reusable air filter may result in:

Service Engine Soon (SES) light on

Transmission shift concerns, slipping and damaged clutch(es) or band(s)

Engine driveability concerns, poor acceleration from a stop, limited engine RPM range

The oil that is used on these air filter elements may be transferred onto the Mass Air Flow (MAF) sensor causing contamination of the sensor. As a result, the Grams per Second (GPS) signal from the MAF may be low and any or all of the concerns listed above may occur.

When servicing a vehicle with any of these concerns, be sure to check for the presence of an aftermarket reusable, excessively/over-oiled air filter. The MAF, GPS reading should be compared to a like vehicle with an OEM air box and filter under the same driving conditions to verify the concern.

The use of an aftermarket reusable air filter DOES NOT void the vehicle's warranty.

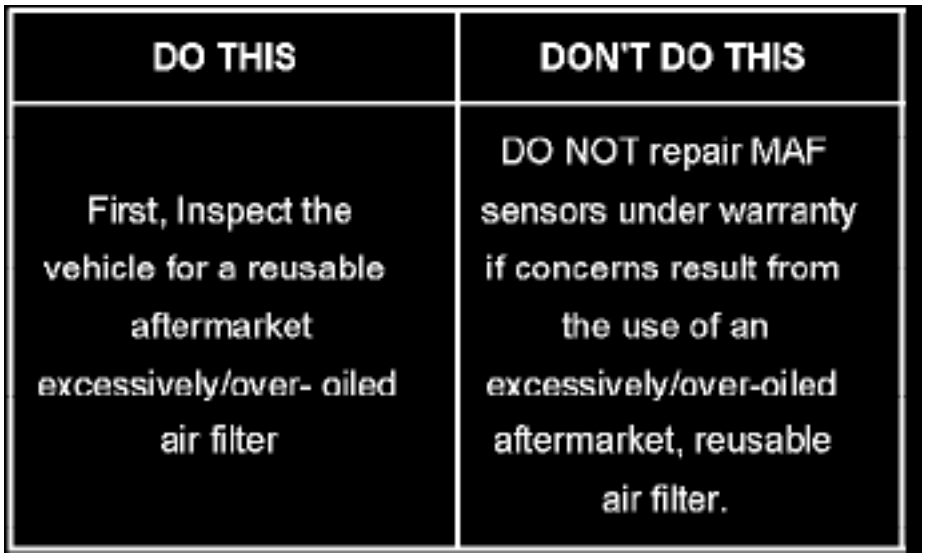
If an aftermarket reusable air filter is used, technicians should inspect the MAF sensor element and the air induction hose for contamination of oil prior to making warranty repairs.

Transmission or engine driveability concerns (related to the MAF sensor being contaminated with oil) that are the result of the use of an aftermarket reusable, excessively/over-oiled air filter are not considered to be warrantable repair items.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer



DO THIS	DON'T DO THIS
First, Inspect the vehicle for a reusable aftermarket excessively/over- oiled air filter	DO NOT repair MAF sensors under warranty if concerns result from the use of an excessively/over-oiled aftermarket, reusable air filter.

Air Filter Element: All Technical Service Bulletins Engine, A/T - Shift/Driveability Concerns/MIL ON

Bulletin No.: 04-07-30-013B

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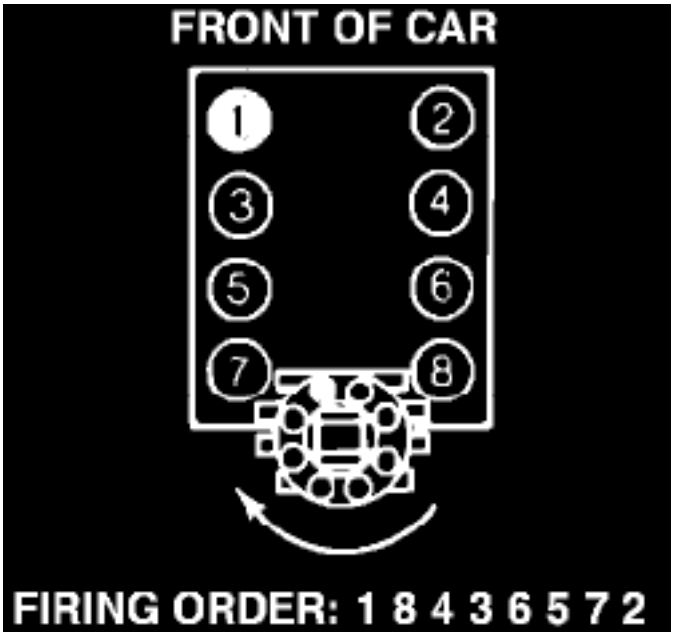
Fuel Pressure Release: Service and Repair

Throttle Body Injected Engines

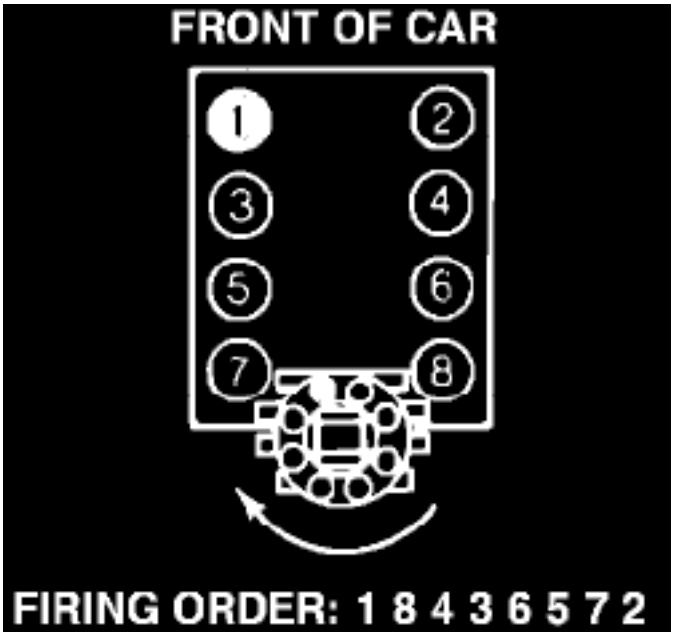
1. Remove fuel pump fuse from fuse box. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and replace fuel pump fuse.

Port Injected Engines

1. Disconnect fuel tank harness connector. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and reconnect fuel tank harness connector.



FIRING ORDER



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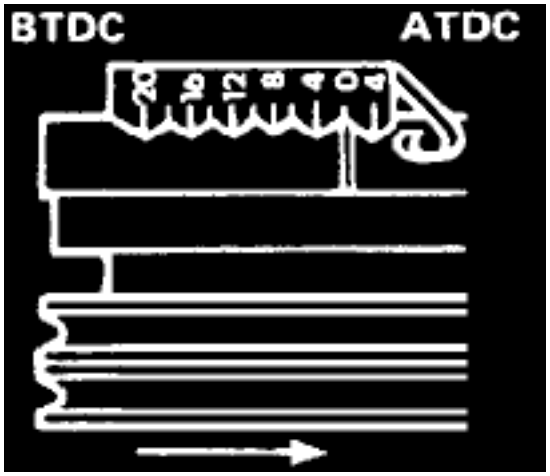
BTDC
ATDC

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Engine, Cooling and Exhaust > Engine > Tune-up and Engine Performance Checks > Spark Plug Wire <--> [Ignition Cable] > Component Information > Technical Service Bulletins > Customer Interest for Spark Plug Wire: > 93356D > Oct > 92 > Engine - Miss, Hesitation, or Roughness

Spark Plug Wire: Customer Interest Engine - Miss, Hesitation, or Roughness

Number: 93-35-6D Section: 6D Date: OCT. 1992 Corporate Bulletin No.: 716404R ASE No.: A1, A8

Subject: ENGINE MISS HESITATION OR ROUGHNESS DUE TO PIERCED SECONDARY IGNITION COMPONENTS

Model and Year: 1980-93 ALL PASSENGER CARS AND TRUCKS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 87-121, DATED MAY 1987. THE 1989-93 MODEL YEARS HAVE BEEN ADDED. ALL COPIES OF 87-121 SHOULD BE DISCARDED.

During the diagnosis procedure for an engine miss, hesitation or roughness, a spark plug or spark plug wire condition may be suspected. Several types of commercial or homemade diagnostic equipment required the secondary ignition boots or wire to be pierced. This is normally done to check for spark plug firing or to perform a cylinder balance test. Similarly the use of pliers or other such tools to disengage a spark plug boot may pierce or damage the boot or wire. Secondary ignition components should not be pierced for any reason.

Piercing a spark plug wire and/or distributor boot may create a condition that will not be immediately apparent. Over time, the hole in the pierced boot may allow a ground path to develop creating a plug misfire condition. Heavily moisture laden air in the vicinity of the pierced boot may accelerate this effect.

Piercing a secondary ignition wire creates a gap in the wire's conductive core. This gap is a point of high resistance. The current flow in the wire will increase to compensate for the higher wire resistance. Over time, the wire may fail creating a plug misfire condition. The time required for the condition to appear depends upon the extent of damage to the conductive core.

To help prevent future condition that are spark plug wire related, do not pierce or otherwise damage any secondary ignition component. Only use diagnostic equipment containing an inductive pick-up to check for spark plug firing or to perform cylinder balance tests. When disengaging a spark plug boot from the spark plug, twist the flanged boot 1/2 turn then pull on the boot only to remove the wire.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Engine, Cooling and Exhaust > Engine > Tune-up and Engine Performance Checks > Spark Plug Wire <--> [Ignition Cable] > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Spark Plug Wire: > 93356D > Oct > 92 > Engine - Miss, Hesitation, or Roughness

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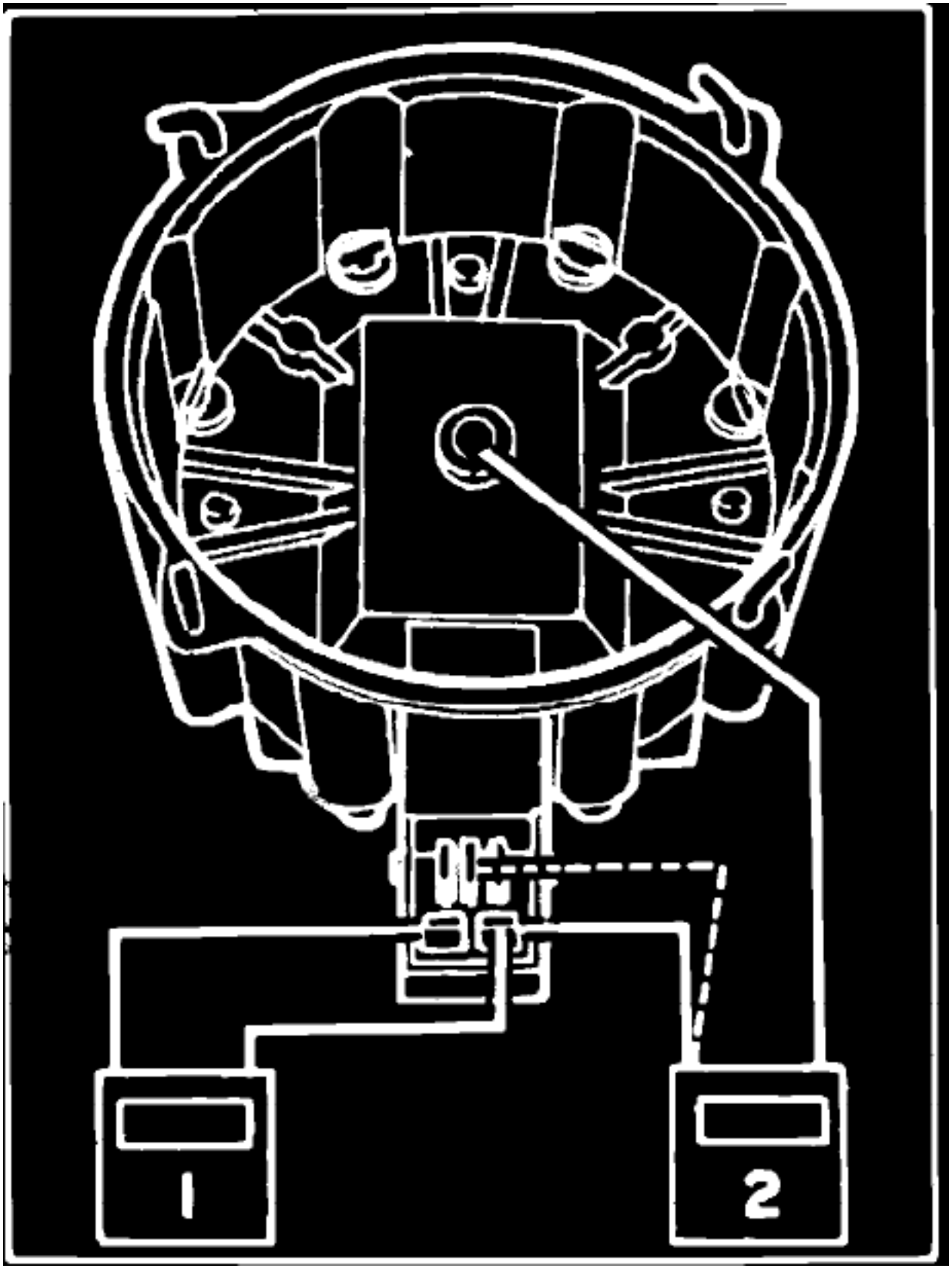
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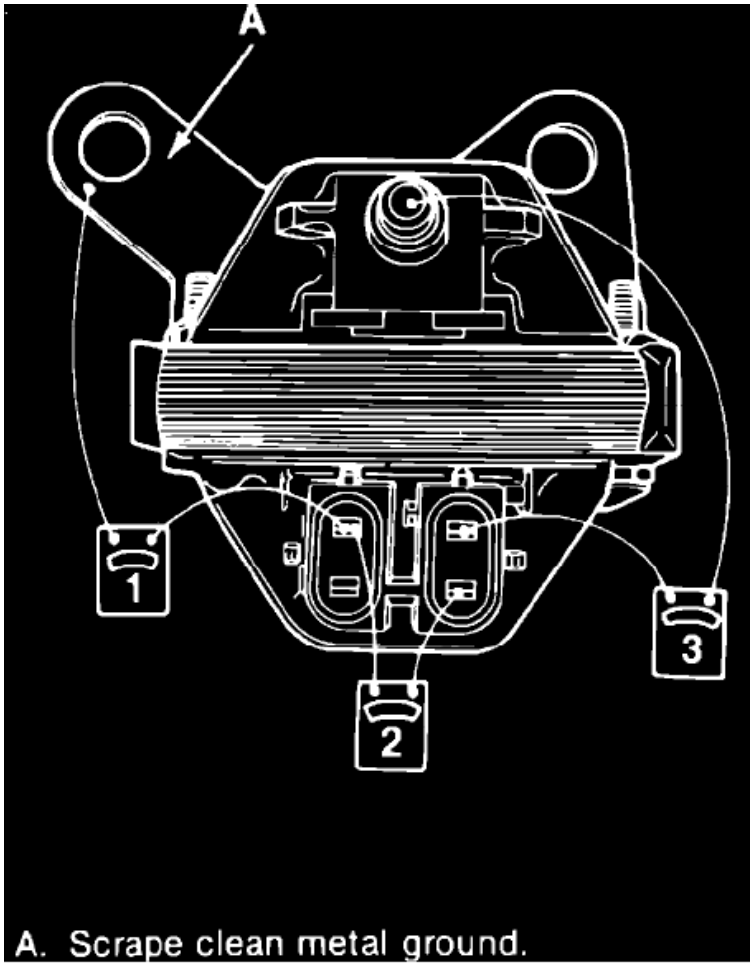
Distributor: Testing and Inspection

Fig. 10 Ignition coil test connections. Models w/internal coil



A. Scrape clean metal ground.

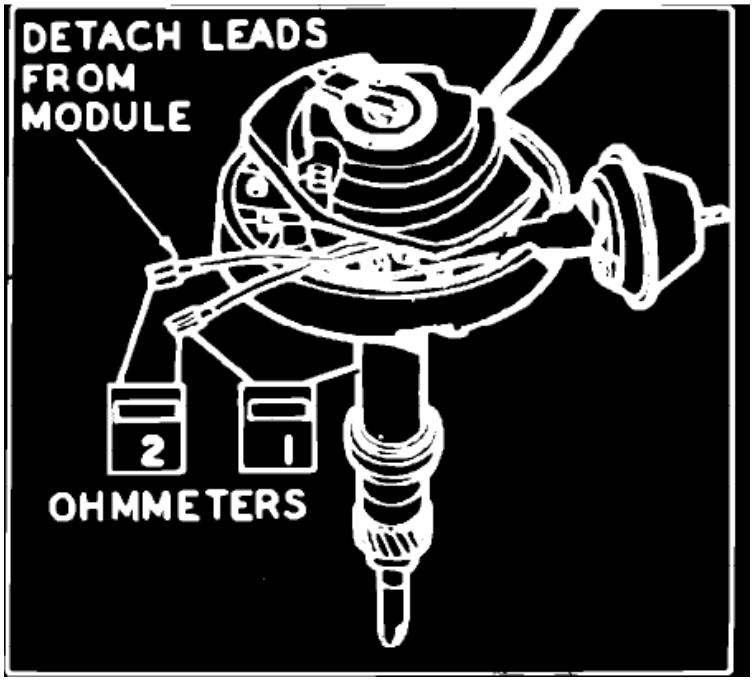


Fig. 11 Ignition coil test connections. Models w/remote coil

Fig. 12 Pickup coil (pole piece) test connections

Tester J-24624 is required to test the module. If this tester is not available, and malfunction still exists after performing the following checks, replace

module.

1. Remove distributor cap and coil assembly, as equipped.

2. Inspect cap, coil and rotor for arcing, carbon tracking and damage, and replace as needed.

3. On models with integral coil, proceed as follows:

a. Connect ohmmeter, Fig. 10, step 1. If reading is other than zero or very near to zero, the ignition coil must be replaced. b. If no ohmmeter reading was observed in step 1, reconnect ohmmeter both ways, Fig. 10, step 2. If both ohmmeter readings are infinite on

high scale, replace ignition coil.

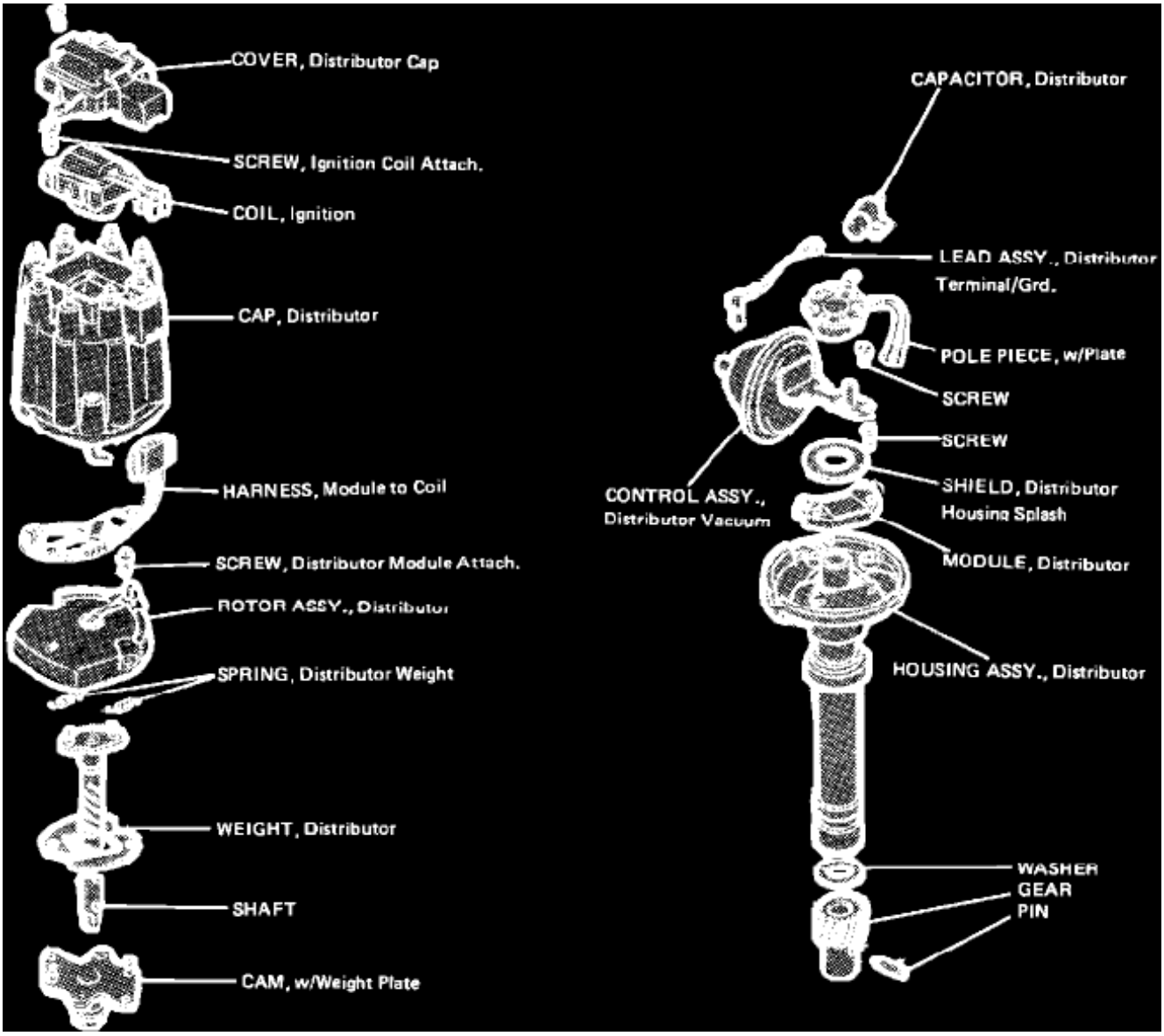
4. On models with remote coil, proceed as follows:

a. Connect ohmmeter, Fig. 11, step 1. If reading is not infinite, replace coil. b. Connect ohmmeter, Fig. 11, step 2. If reading is not zero or near zero, replace coil. c. Connect ohmmeter, Fig. 11, step 3. If reading is infinite, replace coil.

5. Connect an external vacuum source to the vacuum advance unit. Replace vacuum unit if inoperative.

6. If vacuum unit is operating properly, connect ohmmeter, Fig. 12, step 1. If ohmmeter reading on middle scale is not infinite at all times, pickup coil must be replaced.

7. With ohmmeter connected, Fig. 12, step 2, reading should be 500 to 1500 ohms.



Distributor: Service and Repair Distributor Service

Fig. 15 Typical High Energy Ignition (HEI) distributor exploded view

DISASSEMBLY

1. Remove distributor as outlined, then remove rotor, Fig. 15.

2. Remove advance springs and weights (if equipped).

3. Remove module retaining screws and move module to a position where connector may be removed.

4. Remove wires from module terminals.

5. Support distributor gear so that distributor shaft will not be damaged, then remove roll pin by driving it out with a punch.

6. Remove gear, shim and tanged washer from shaft. Remove any burrs that may have been caused by removal of roll pin. Some distributors do not use a shim or tanged washer.

7. Remove distributor shaft and magnet assembly.

8. Remove pole piece retaining screws, pole piece, magnet and pickup coil.

9. Remove lock ring from top of housing, pickup coil retainer and felt washer.

10. Remove vacuum advance unit (if equipped).

11. Remove capacitor and wiring harness from distributor housing.

ASSEMBLY

1. Install vacuum advance unit (if used) and secure with two screws, Fig. 15.

2. Place felt washer over lubricant reservoir at top of housing.

3. Position pick up coil retainer onto housing with vacuum advance arm over actuating pin of vacuum advance mechanism and secure with lock ring.

4. Install pick up coil magnet and pole piece. Loosely install the three retaining screws.

5. Install distributor shaft and rotate to check for even clearance all around between pole piece and shaft projections.

6. Move pole piece to provide even clearance and secure with three retaining screws.

7. Install drive onto shaft with teeth facing up. Drive gear has a dimple on one side next to drive pin hole. Align drive gear so that dimple is on same

side of shaft as the rotor pointer. Temporarily install rotor to ensure correct alignment.

8. Install tanged washer, shim and drive gear, then retain with a new roll pin.

9. Install capacitor and loosely install retaining screw.

10. Install connector on module with tab on top, then liberally apply silicone grease to bottom of module and install screws. Failure to apply silicone grease to module will cause excessive heat build up of module and premature failure.

11. Position wiring harness with grommet in housing notch, then connect pink wire to capacitor stud and black wire to capacitor retaining screw. Tighten screw.

12. Reconnect wires to module, then install centrifugal advance weights and springs.

Distributor: Service and Repair Distributor Replace

UNITS W/INTEGRAL COIL

Removal

1. Disconnect electrical connectors from distributor cap and disconnect 4 wire EST connector. Carefully bend connector locking tabs away from housing by hand to prevent damage to locking tabs.

2. Remove distributor cap assembly leaving plug wires connected and position cap aside.

3. Remove No. 1 spark plug, crank engine until compression pressure can be felt in No. 1 cylinder, then slowly rotate crankshaft until timing marks are aligned at TDC on compression stroke for No. 1 cylinder.

4. Disconnect battery ground cable, then mark position of distributor body in relation to engine and position of rotor contact in relation to distributor body.

5. Remove distributor hold-down bolt, raise distributor noting rotor rotation, place second mark on distributor housing to indicate position where rotor stops moving, then remove distributor. Do not rotate crankshaft with distributor removed from engine.

Installation

1. Ensure No. 1 cylinder is at TDC on compression stroke as outlined in removal procedure.

2. Align rotor with second mark made in step 5 of removal procedure.

3. Insert distributor into engine, aligning body with mark made on engine prior to removal, then seat distributor in engine. With distributor fully seated, marks made in step 4 of removal procedure should be aligned. If distributor will not seat against boss on engine, oil pump driveshaft may have to be rotated slightly to allow proper installation.

4. Install hold-down clamp and hand tighten retaining bolt.

5. Reverse remaining procedure to complete installation, then adjust ignition timing as outlined.

UNITS W/REMOTE COIL

Removal

1. Disconnect distributor harness and feed wire connectors from ignition coil and disconnect EST connector.

2. Remove distributor cap leaving plug wires connected and position cap aside.

3. Remove No. 1 spark plug, crank engine until compression pressure can be felt in No. 1 cylinder, then slowly rotate crankshaft until timing marks are aligned at TDC on compression stroke for No. 1 cylinder.

4. Disconnect battery ground cable, then mark position of distributor body in relation to engine and position of rotor contact in relation to distributor body.

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Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Engine, Cooling and Exhaust > Engine > Tune-up and Engine Performance Checks > Spark Plug > Component Information > Technical Service Bulletins > Customer Interest for Spark Plug: > 86B77 > Apr > 86 > Engine - Spark Knock, Poor Performance

Spark Plug: Customer Interest Engine - Spark Knock, Poor Performance

NUMBER: 86-B-77

GROUP: 6D - Engine Electrical

DATE: April, 1986

SUBJECT: SPARK KNOCK (PREIGNITION)

MODELS: 1984-85 C, K, G TRUCKS EQUIPPED WITH THE LE9 5.0L, LF3 5.0L, OR LS9 5.7L ENGINE AND ELECTRIC SPARK CONTROL (ESC) FEDERAL EMISSIONS AND ELECTRONIC SPARK TIMING (EST) CALIFORNIA EMISSIONS.

THIS BULLETIN CANCELS AND SUPERSEDES 86-B-21 (DECEMBER, 1985) ALL COPIES OF WHICH SHOULD BE DESTROYED.

Some 1984-85 vehicles equipped with the LE9 5.0L (VIN Code H), LF3 5.0L (VIN Code F), or LS9 5.7L (VIN Code L) engine may experience detonation (preignition) or poor performance when operating in a loaded condition or pulling a grade. As a result of the preignition, the ESC (Federal) or EST (California) retards the spark timing, and a noticeable reduction in performance may occur. In the event the preignition condition is not corrected by the ESC/EST spark retard, continued operation under these conditions could result in internal engine damage. To reduce the possibility of this occurrence, the spark plugs should be changed to a colder heat range. When these conditions exist, the original equipment (R44TS) spark plugs should be replaced with R43CTS (P/N 5613810). The correct spark plug gap is .045". Starting with 1986 vehicles, the LE9, LF3, LS9, and LT9 engines are built with the R43CTS spark plugs.

Spark Plug: All Technical Service Bulletins Engine - Spark Knock, Poor Performance

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Spark Plug: Specifications

Plug Tightening Torque 22 ft.lb

Engine	Year	Gap (inches)	Gap (mm)	Torque (ft-lb)
4-cyl. 1.9L (119)	1982-86	.044	1.1	—
4-cyl. 2.0L (122)	1983-84	.035	.89	7-15
4-cyl. 2.5L (151)	1985-90	.060	1.52	7-15
V-6 2.8L, 3.8L	1982-90	.045	1.14	7-15
V-6 4.3L	1985-90	.035	.89	7-15
6-cyl.	1981-89	.035	.89	17-27
8-cyl.	1981-86	.045	1.14	17-27
8-cyl.: Light Duty	1987-88	.035	.89	22
Heavy Duty	1987-88	.045	1.14	22
8-cyl.	1989-90	.035	.89	22

SPARK PLUGS

Compression Check: Specifications

Minimum, 698 kPa (100 psi) @ 200 rpm. The lowest cylinder reading should not be less than 80% of the highest. Perform compression test with engine at normal operating temperature, spark plugs removed and throttle wide open.

Valve Clearance: Specifications

FRONT TO REAR 6-250, 292.....
.....E-I-I-E-E-I-I-E-E-I-I-E V6-231.....
.....
.....E-I-I-E-I-E V6-262 Left Side.....
.....E-I-E-I-I-E Right Side.....
.....
.....E-I-I-E-I-E V8-267, 305, 350, 400.....
.....E-I-I-E-E-I-I-E V8-454....
.....
.....E-I-E-I-E-I-E-I

Valve Clearance: Adjustments

STATIC ADJUSTMENT

NOTE: This procedure does not apply to 231 V-6 engines.

1. Start engine and allow to reach normal operating temperature, then shut engine off.

2. With engine in position to fire No. 1 cylinder, adjust the following valves: V6-229 and 262, Exhaust Nos. 1, 5 and 6; Intake Nos. 1, 2 and 3. 6-250 and 292, Exhaust Nos. 1, 3 and 5; Intake Nos. 1, 2 and 4. V8 engines, Exhaust Nos. 1, 3, 4 and 8; Intake Nos. 1, 2, 5 and 7. To properly adjust valves, tighten adjusting nut until all lash is eliminated, then tighten nut the specified additional number of turns. On V8-454 / 7.4L engine, tighten nut 3/4 additional turn from zero lash. On all others, tighten nut one full turn from zero lash.

3. Turn crankshaft one complete revolution, which will bring engine in position to fire cylinders 4(V6) or 6(Inline 6 and V8). With engine in this position, adjust the following valves: V6-229 and 262, Exhaust Nos. 2, 3 and 4; Intake Nos. 4, 5 and 6. 6-250 and 292, Exhaust Nos. 2, 4 and 6; Intake Nos. 3, 5 and 6. V8 engines, Exhaust Nos. 2, 5, 6 and 7; Intake Nos. 3, 4, 6 and 8. When zero lash is obtained, tighten adjusting nuts as specified in step 2.

ENGINE RUNNING ADJUSTMENT

NOTE: The following procedure, performed with the engine running, should be done only in case readjustment is required.

1. After engine has been warmed to operating temperature, remove valve cover and install a new valve cover gasket.

2. With engine running at idle speed, back off valve rocker arm nut until rocker arm starts to clatter.

3. Turn rocker arm nut down slowly until the clatter just stops. This is the zero lash position.

4. Turn nut down 1/4 additional turn and pause 10 seconds until engine runs smoothly. Repeat additional 1/4 turns, pausing 10 seconds each time, until nut has been turned down the specified number of turns from the zero lash position. This preload adjustment must be done slowly to allow the lifter to adjust itself to prevent the possibility of interference between the intake valve head and top of piston, which might result in internal damage and/or bent pushrods. Noisy lifters should be replaced.

Water Pump: Service and Repair

EXC. V6-231

1. Drain cooling system.

2. Remove fan belt and fan.

3. Disconnect all hoses from water pump.

4. Remove alternator upper and lower mounting braces, if necessary.

5. Remove pump attaching bolts and remove water pump. On 6-250 engines, pull pump straight out of block to prevent damage to impeller.

6. Reverse procedure to install.

Table 1 — Approved and Licensed Providers of DEX-COOL Products Meeting General Motors GM6277M Specifications

License #	Provider
DC 001	Chevron
DC 002	Prestone
DC 003	Shell
DC 004	Valvoline
DC 005	Recycled Fluid Technologies (Bulk Service)
DC 011	GM Vehicle Care
DC 011	AC Delco

Coolant: Technical Service Bulletins Cooling System - Coolant Recycling Information

Bulletin No.: 00-06-02-006D

Date: August 15, 2006

INFORMATION

Subject: Engine Coolant Recycling and Warranty Information

Models: 2007 and Prior GM Passenger Cars and Trucks (Including Saturn) 2007 and Prior HUMMER Vehicles 2005-2007 Saab 9-7X

Attention:

Please address this bulletin to the Warranty Claims Administrator and the Service Manager.

Supercede:

This bulletin is being revised to adjust the title and Include Warranty Information. Please discard Corporate Bulletin Number 00-06-02-006C (Section 06 - Engine/Propulsion System).

Coolant Reimbursement Policy

General Motors supports the use of recycled engine coolant for warranty repairs/service, providing a GM approved engine coolant recycling system is used. Recycled coolant will be reimbursed at the GMSPO dealer price for new coolant plus the appropriate mark-up. When coolant replacement is required during a warranty repair, it is crucial that only the relative amount of engine coolant concentrate be charged, not the total diluted volume. In other words: if you are using two gallons of pre-diluted (50:50) recycled engine coolant to service a vehicle, you may request reimbursement for one gallon of GM Goodwrench engine coolant concentrate at the dealer price plus the appropriate warranty parts handling allowance.

Licensed Approved DEX-COOL(R) Providers

Important:

USE OF NON-APPROVED VIRGIN OR RECYCLED DEX-COOL(R) OR DEVIATIONS IN THE FORM OF ALTERNATE CHEMICALS OR ALTERATION OF EQUIPMENT, WILL VOID THE GM ENDORSEMENT, MAY DEGRADE COOLANT SYSTEM INTEGRITY AND PLACE THE COOLING SYSTEM WARRANTY UNDER JEOPARDY.

Shown in Table 1 are the only current licensed and approved providers of DEX-COOL(R). Products that are advertised as "COMPATIBLE" or "RECOMMENDED" for use with DEX-COOL(R) have not been tested or approved by General Motors. Non-approved coolants may degrade the

Table 2 — Approved Engine Coolant Recycling Services – DEX-COOL®

Recycler	Equipment/Service	Recycled Products	Demographics	Contact
Recycling Fluid Technologies	Service	DEX-COOL® Licensed Provider (50/50 pre-mix)	IN, IL, MI, OH	800-474-4947

coolant system integrity and will no longer be considered a 5 yr/150,000 mile (240,000 km) coolant.

Coolant Removal Services/Recycling

The tables include all coolant recycling processes currently approved by GM. Also included is a primary phone number and demographic information. Used DEX-COOL(R) can be combined with used conventional coolant (green) for recycling. Depending on the recycling service and/or equipment, it is then designated as a conventional 2 yr/30,000 mile (50,000 km) coolant or DEX-COOL(R) 5 yr/150,000 mile (240,000 km) coolant. Recycled coolants as designated in this bulletin may be used during the vehicle(s) warranty period.

DEX-COOL(R) Recycling

The DEX-COOL(R) recycling service listed in Table 2 has been approved for recycling waste engine coolants (DEX-COOL) or conventional) to DEX-COOL(R) with 5 yr/150,000 mile (240,000 km) usability. Recycling Fluid Technologies is the only licensed provider of Recycled DEX-COOL(R) meeting GM6277M specifications and utilizes GM approved inhibitor packages. This is currently a limited program being monitored by GM Service Operations which will be expanded as demand increases.

Conventional (Green) Recycling

Table 3 — Approved Engine Coolant Recycling Services and Equipment – Conventional Green

Recycler	Equipment/Service	Recycled Products	Demographics	Contact
Antifreeze Technologies Systems	Service	Conventional Green (50/50 pre-mix)	IL, IN, MA, MD, MI, NH, NJ, PA, TX, VA	800-474-4947
Asbury Environmental Services/Demenno Kerdoon - Trinity Brand	Service	Conventional Green (50/50 pre-mix)	AZ, CA, NV, OR, WA	800-974-4495
Automotive Environmental Service	Service	Conventional Green (50/50 pre-mix)	AZ, CA, NV, OR, WA	650-325-2666
Kleentek	AF-250	Conventional Green (50/50 pre-mix)	US, Canada, Mexico	800-435-5336
Wynn Oil Company	Du-All Bulk 07400	Conventional Green (50/50 pre-mix)	US, Canada, Mexico	800-GMTools 800-989-8363
Clore Automotive	TechGuard	Conventional Green (50/50 pre-mix)	US, Canada, Mexico	800-328-2921

Processes shown in the Table 3 are capable of recycling waste engine coolants (DEX-COOL(R) or conventional) to a conventional (green) coolant. Recycling conventional coolant can be accomplished at your facility by a technician using approved EQUIPMENT (listed by model number in Table 3), or by an approved coolant recycling SERVICE which may recycle the coolant at your facility or at an offsite operation. Refer to the table for GM approved coolant recyclers in either of these two categories. Should you decide to recycle the coolant yourself, strict adherence to the operating procedures is imperative. Use ONLY the inhibitor chemicals supplied by the respective (GM approved) recycling equipment manufacturer.

Sealing Tablets

Cooling System Sealing Tablets (Seal Tabs) should not be used as a regular maintenance item after servicing an engine cooling system. Discoloration of coolant can occur if too many seal tabs have been inserted into the cooling system. This can occur if seal tabs are repeatedly used over the service life of a vehicle. Where appropriate, seal tabs may be used if diagnostics fail to repair a

small leak in the cooling system. When a condition appears in which seal tabs may be recommended, a specific bulletin will be released describing their proper usage.

Water Quality

The integrity of the coolant is dependent upon the quality of DEX-COOL(R) and water. DEX-COOL(R) is a product that has enhanced protection capability as well as an extended service interval. These enhanced properties may be jeopardized by combining DEX-COOL(R) with poor quality water. If you suspect the water in your area of being poor quality, it is recommended you use distilled or de-ionized water with DEX-COOL(R).

"Pink" DEX-COOL(R)

DEX-COOL(R) is orange in color to distinguish it from other coolants. Due to inconsistencies in the mixing of the dyes used with DEX-COOL(R), some batches may appear pink after time. The color shift from orange to pink does not affect the integrity of the coolant, and still maintains the 5 yr/150,000 mile (240,000 km) service interval.

Back Service

Only use DEX-COOL(R) if the vehicle was originally equipped with DEX-COOL(R).

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Contamination

Mixing conventional green coolant with DEX-COOL(R) will degrade the service interval from 5 yrs./150,000 miles (240,000 km) to 2 yrs./30,000 miles (50,000 km) if left in the contaminated condition. If contamination occurs, the cooling system must be flushed twice immediately and re-filled with a 50/50 mixture of DEX-COOL(R) and clean water in order to preserve the enhanced properties and extended service interval of DEX-COOL(R).

After 5 years/150,000 miles (240,000 km)

After 5 yrs/150,000 miles (240,000 km), the coolant should be changed, preferably using a coolant exchanger. If the vehicle was originally equipped with DEX-COOL(R) and has not had problems with contamination from non-DEX-COOL(R) coolants, then the service interval remains the same, and the coolant does not need to be changed for another 5 yrs/150,000 miles (240,000 km)

Equipment (Coolant Exchangers)

The preferred method of performing coolant replacement is to use a coolant exchanger. A coolant exchanger can replace virtually all of the old coolant with new coolant. Coolant exchangers can be used to perform coolant replacement without spillage, and facilitate easy waste collection. They can also be used to lower the coolant level in a vehicle to allow for less messy servicing of cooling system components. It is recommended that you use a coolant exchanger with a vacuum feature facilitates removing trapped air from the cooling system. This is a substantial time savings over repeatedly thermo cycling the vehicle and topping-off the radiator. The vacuum feature also allows venting of a hot system to relieve system pressure. Approved coolant exchangers are available through the GMDE (General Motors Dealer Equipment) program.

For refilling a cooling system that has been partially or fully drained for repairs other than coolant replacement, the Vac-N-Fill Coolant Refill Tool (GE-47716) is recommended to facilitate removal of trapped air from the cooling system during refill.

Disclaimer

Coolant: Technical Service Bulletins Coolant - Used Anti-Freeze Policy

Number: 91-09-0A

Section: OA

Date: April 1990

Corporate Bulletin No.: 976202 Subject:

INFORMATION REGARDING RECONSTITUTED ANTI-FREEZE COOLANT TESTING AND THE USE OF A REFRACTOMETER

Model and Year: ALL MODELS AND YEARS

TO: ALL CHEVROLET DEALERS

RECONSTITUTED ANTIFREEZE

At present, three types of recycling systems are available:

1) chemical addition to coolant;

2) filtration and addition of supplemental additives; and

3) separation of pure glycol from used coolant and reinhibition.

1) Chemical Addition-NOT RECOMMENDED

With chemical addition, chemicals are added to the used engine coolant in an attempt to "clean up" the coolant. This system is the easiest since the only work involved is the addition of chemicals to the radiator. Most of these types of recycling systems use a strong acid to change precipitated corrosion products into a more soluble form. However, in addition to dissolving the corrosion products, the strong acid also attacks and corrodes the metals of the cooling system.

2) Filtration and Addition of Supplemental Additives-NOT RECOMMENDED

In this type of system, the used coolant is either taken out of the vehicle or a flush-type unit is connected to the cooling system.

The current technology consists simply of filtration and reinhibition of the spent coolant. While this does remove suspended solids, filtration does nothing to remove harmful degradation and corrosion products that are soluble in glycol solution. The reinhibition step used in current recycling systems may fail to produce a coolant which adequately protects all metals including aluminum in the most critical heat transfer applications, such as occurs in the cylinder heads and blocks. 3)

Separation of Pure Glycol and InhibitionThe separation of pure glycol and the addition of fresh inhibitors is the ideal method for recycling coolants. Unfortunately, this method is expensive from both a collection standpoint and the technology available to economically extract pure ethylene glycol from used coolant.

At this time, General Motors does not endorse these practices or equipment.

Due to a worldwide shortage of ethylene glycol in 1988, some coolant manufacturers have started to mix other types of glycol in their coolant formulations; propylene glycol is the most common new ingredient. A hydrometer will not provide a correct measurement of freeze protection when anything other than ethylene glycol and water is being tested. The degree of inaccuracy will vary depending on the proportion of other glycols present in the coolant.

Hydrometers test the amount of glycol in a mixture by measuring the specific gravity of the mixture; the more ethylene glycol, the higher the float balls go, and the better the freeze protection. Because ethylene glycol and propylene glycol do not have the same specific gravities, hydrometer readings of mixtures containing propylene glycol give incorrect values.

As the shortage of ethylene glycol continues and/or worsens, more and more variations in antifreeze formulas will be marketed. It is, therefore, recommended that you purchase a "refractometer" and encourage your technicians to use it. Refractometers test for the amount of glycol in a coolant mixture by measuring the speed of light as it passes through the fluid and are not affected by the specific gravity of the glycol. The freeze protection of solutions of ethylene glycol in water, solutions of propylene glycol in water, and solutions of mixtures of propylene glycol and ethylene glycol in water may all be tested with sufficient accuracy using a refractometer.

The following refractometers are available from Kent Moore:

J 23688 Farenheit scale, measures to -50 F

J 26568 Centigrade scale, measures to -45.5 C

J 38633 Farenheit scale, measures to -84 F (For extreme cold weather regions)

The toll free number for Kent Moore is 1-800-345-2233.

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Coolant: Technical Service Bulletins Warranty - Recycled Engine Coolant Policy

Group Ref.: Warranty Administration Bulletin No.: 310504 Date: February, 1994

WARRANTY ADMINISTRATION

SUBJECT: RECYCLED ENGINE COOLANT POLICY

MODELS: 1994 AND PRIOR PASSENGER CARS AND TRUCKS

ATTENTION: WARRANTY CLAIMS ADMINISTRATOR AND SERVICE MANAGER

General Motors supports the use of recycled engine coolant for warranty repairs/service, providing a GM approved engine coolant recycling system is used. For detailed information on GM approved engine coolant recycling equipment guidelines refer to the following bulletins: Cadillac 93-1-18, GMC Truck 93-6B-34, Chevrolet 93-73-6B, Pontiac 93-6-18, Oldsmobile 1-93-43, Buick 93-6B-1 (Corporate Number 236203).

Recycled coolant will be reimbursed at the GMSPO dealer price for new coolant plus the appropriate mark-up. When coolant replacement is required during a warranty repair, it is crucial to assure that only the relative amount of engine coolant concentrate be charged, not the total diluted volume. In other words, if you are using two gallons of pre-diluted (50:50) recycled engine coolant to service a vehicle, you may request reimbursement for one gallon of Goodwrench engine coolant concentrate at the dealer price plus the appropriate warranty parts handling allowance.

Coolant: Technical Service Bulletins Coolant - Information on Propylene Glycol Usage

File In Section: 6 - Engine

Bulletin No.: 43-62-01B

Date: April, 1995

Subject: Propylene Glycol Engine Coolant

Models: 1994 and Prior Passenger Cars and Trucks

This bulletin is being revised to reflect most current information on propylene glycol engine coolant. Please discard Corporate Bulletin Number 4362O1A (Group Reference 6 - Engine).

General Motors has been reviewing data supplied on the performance of propylene glycol engine coolant in GM vehicles. It is our conclusion that propylene glycol engine coolant will perform adequately under most vehicle operating conditions. As a result, propylene glycol engine coolant (meeting performance specification GM 1825M) may be used in GM vehicles and will not affect the warranty coverage.

Prior to adding propylene glycol engine coolant to the cooling system, all the existing (ethylene glycol) coolant must be removed. This can be accomplished either by utilizing water-based coolant flushing equipment or "waterless quick change" equipment available in the GMDE program. As with any coolant change procedure, be sure to thoroughly purge the heater core and block as well as the radiator before attempting to convert the system to propylene glycol coolant.

Freeze/Boil point levels are different for propylene glycol than for ethylene glycol engine coolant. To accurately determine freeze/boil protection level, it is imperative that coolants not be mixed. Removing all the used coolant as previously discussed resolves this concern. Freeze protection of propylene glycol cannot be determined using a standard hydrometer. Rather, a refractometer or test strip must be used.

Propylene glycol engine coolants may be recycled in the same manner as conventional ethylene glycol coolant. No adverse effects will be encountered if these coolants are mixed prior to recycling, however, the ratio of propylene glycol coolant to ethylene glycol coolant should be kept low to minimize the effects on freeze point measurements.

Coolant: Technical Service Bulletins Cooling System - Reconstituted Anti-Freeze Information

Number: 90-49-6B

Section: 6B

Date: August 1989

Corporate Bulletin No.: 930107

Subject: RECONSTITUTED ANTI-FREEZE

Model and Year: ALL MODELS, ALL MODEL YEARS

TO: ALL CHEVROLET DEALERS

This bulletin provides information on "reconstituted anti-freeze".

It has been brought to our attention that a number of manufacturers claim to have the capability of reconstituting engine coolant on site. At this time, General Motors does not endorse this practice or any equipment.

Anti-freeze recycling is a very complex issue. In use as an engine coolant, ethylene glycol becomes oxidized producing a very degraded and deteriorated substance. Contamination by other automotive fluids during draining, handling and storage is also a major detriment to the reclaiming process. There is no additive we are aware of that can be merely put into used coolant that will restore it to an acceptable state.

Typically, a multi-million dollar facility, utilizing sophisticated technology with distillation capabilities along with appropriate quality control would be required to adequately process used coolant to bring it to GM specifications.

Disposal of all chemical products should be done in accordance with all applicable federal, state and local laws and regulations.

Review engine coolant substitutes Dealer Service Bulletin No. 89-57-6B, dated January 1989.

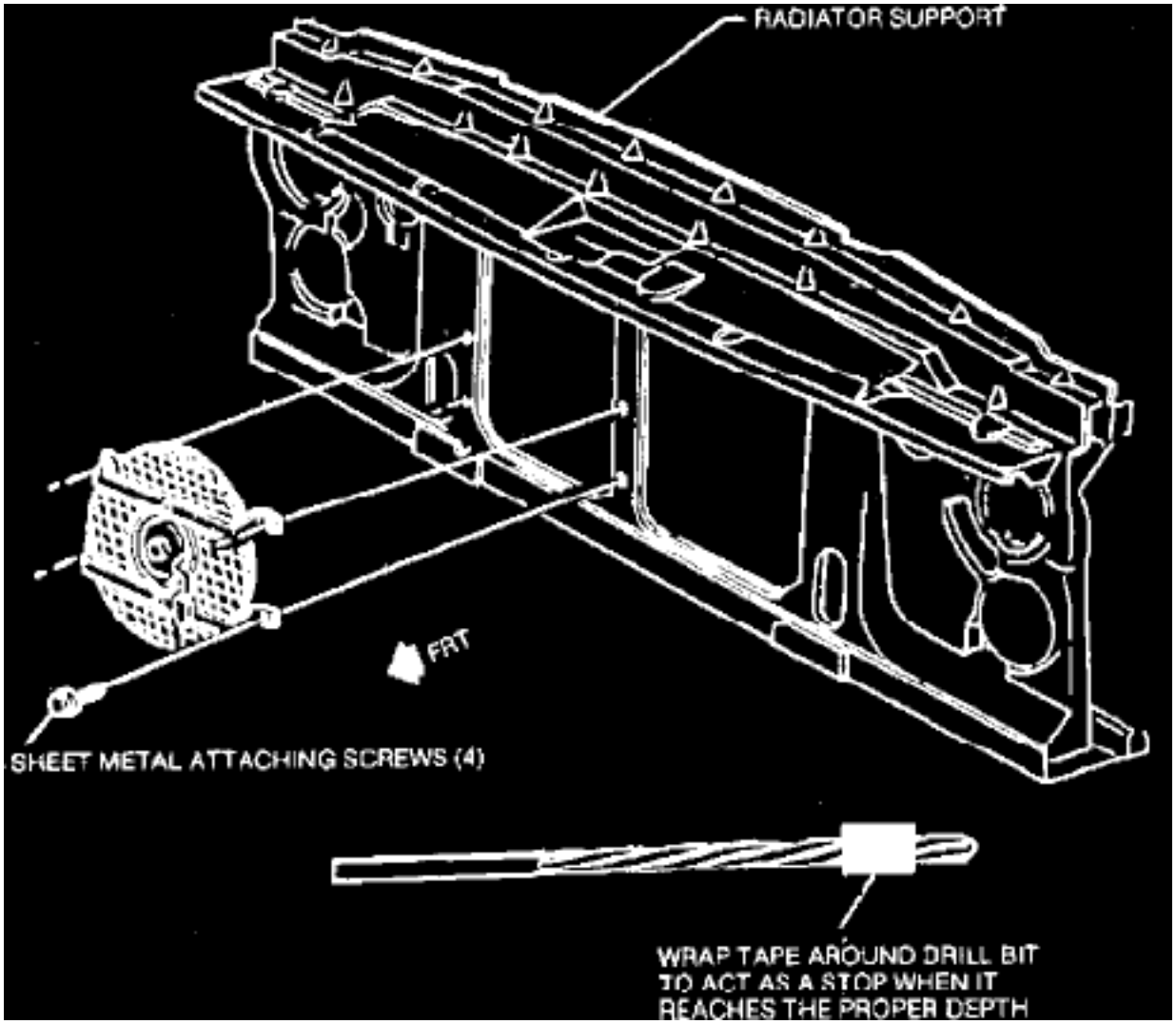
Coolant: Specifications

Less A/C System Capacity 16.8 qt (US)

With A/C System Capacity 17.2 qt (US)

Coolant Level Indicator Lamp: Service and Repair

This lamp will be illuminated when engine coolant level in the radiator drops below a pre-determined level. To turn lamp "OFF," check cooling system, then add coolant to bring system to proper level.



Radiator Cooling Fan Motor: Service and Repair

REMOVE and REPLACE

1. Disconnect battery ground cable.

2. Remove grille assembly.

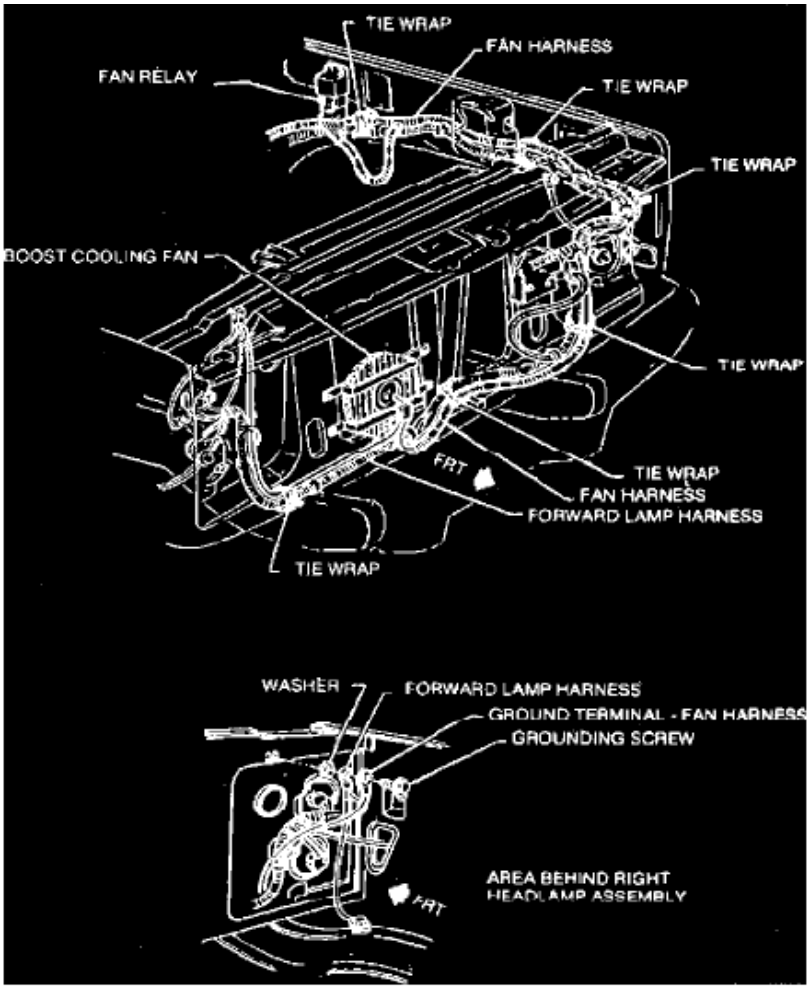
3. Disconnect electrical connector from cooling fan.

4. Remove fan assembly attaching bolts and the fan.

5. Reverse procedure to install.

COOLING FAN MODIFICATIONS (IF APPLICABLE)

Fig. 1 Electric cooling fan installation


TIE WRAP
FAN HARNESS
FAN RELAY
TIE WRAP
TIE WRAP
BOOST COOLING FAN
TIE WRAP
FRT
TIE WRAP
FAN HARNESS
FORWARD LAMP HARNESS
TIE WRAP
WASHER
FORWARD LAMP HARNESS
GROUND TERMINAL - FAN HARNESS
GROUNDING SCREW
AREA BEHIND RIGHT
HEADLAMP ASSEMBLY
FRT

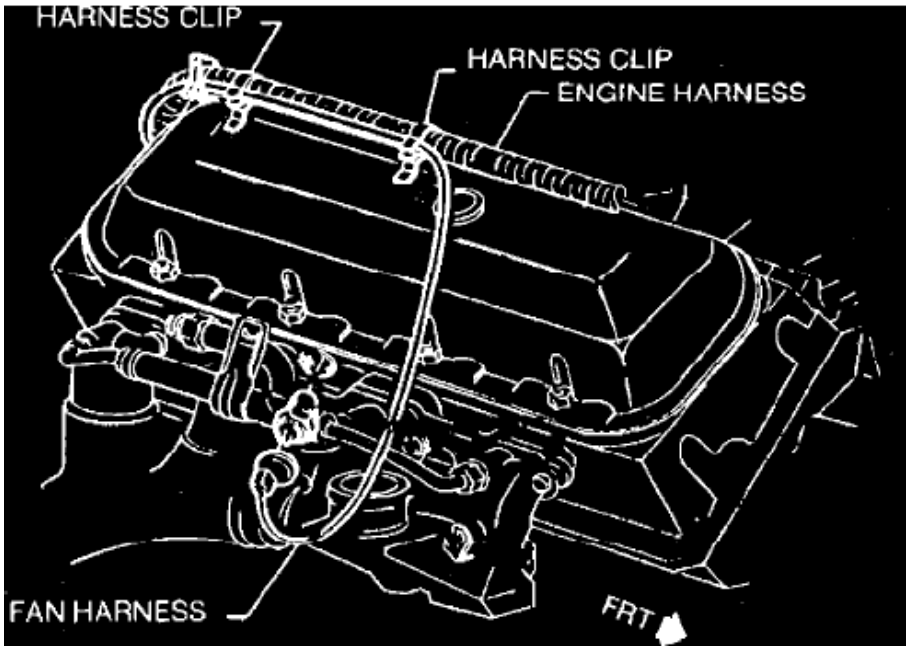

HARNESS CLIP
HARNESS CLIP
ENGINE HARNESS
FAN HARNESS
FRT

Fig. 2 Electric cooling fan wiring harness installation

Fig. 3 Electric cooling fan temperature sender installation

As of January 1, 1985, all C, K, R and V-20/2500-30/3500 models equipped with the V8-454 engine and heavy duty emissions systems are equipped with an auxiliary electric engine cooling fan. Similar 1982---85 truck models not equipped with the fan may have one installed using the following procedure:

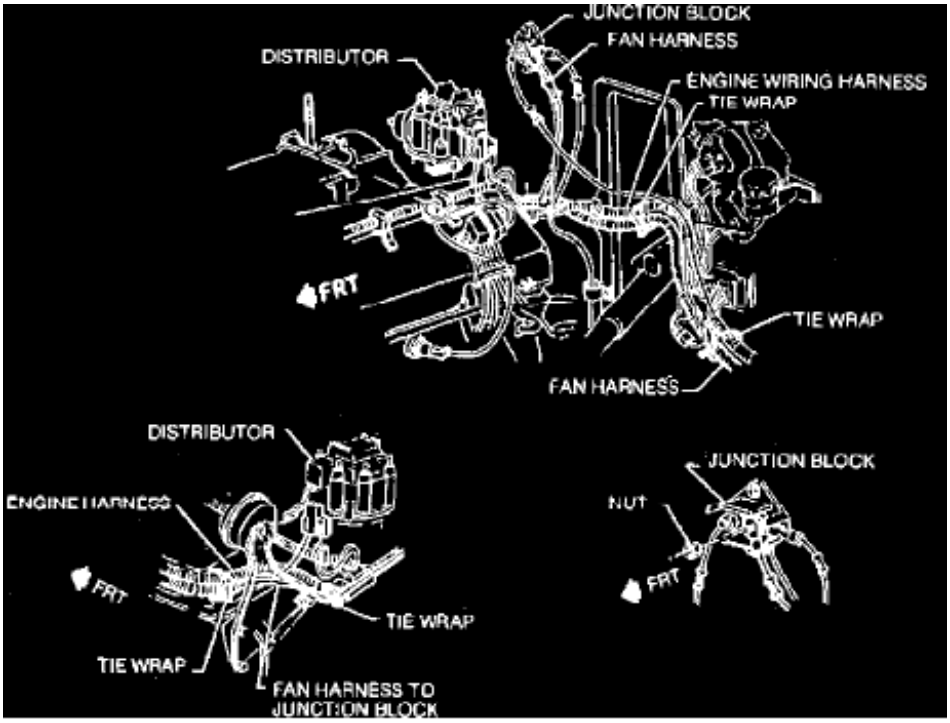
1. Disconnect battery ground cable.

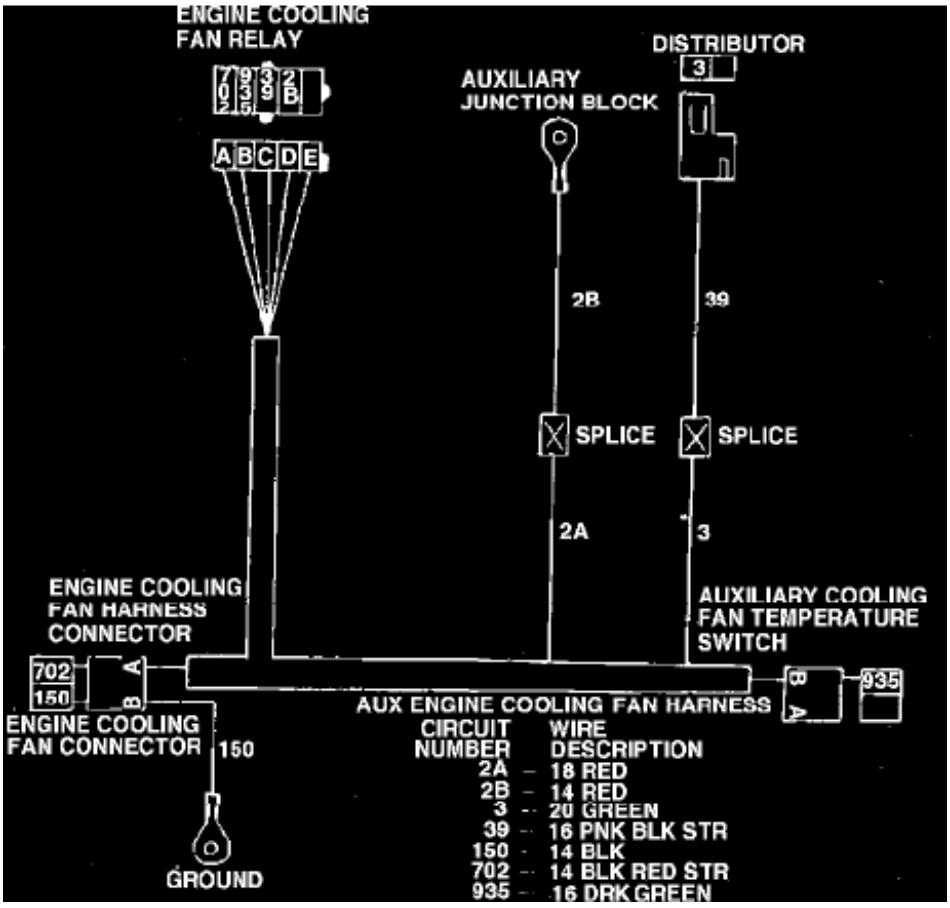
2. Remove grille assembly.

3. Drill mounting holes and install fan assembly (part No. 15593566), Fig. 1.

4. Drain cooling system, then install fan relay (part No. 14078902), Fig. 2.

5. Install fan wiring harness (part No. 12064526), Fig. 2. Secure harness to fender and radiator support away from sharp edges.


JUNCTION BLOCK
FAN HARNESS
DISTRIBUTOR
ENGINE WIRING HARNESS
TIE WRAP
FRT
TIE WRAP
FAN HARNESS
DISTRIBUTOR
ENGINE HARNESS
FRT
TIE WRAP
TIE WRAP
FAN HARNESS TO JUNCTION BLOCK
JUNCTION BLOCK
NUT
FRT


ENGINE COOLING FAN RELAY
DISTRIBUTOR
3
AUXILIARY JUNCTION BLOCK
A B C D E
2B
39
SPLICE
SPLICE
2A
3
ENGINE COOLING FAN HARNESS CONNECTOR
AUXILIARY COOLING FAN TEMPERATURE SWITCH
702
150
935
AUX ENGINE COOLING FAN HARNESS
ENGINE COOLING FAN CONNECTOR
150
GROUND
CIRCUIT NUMBER WIRE DESCRIPTION
2A – 18 RED
2B – 14 RED
3 – 20 GREEN
39 – 16 PNK BLK STR
150 – 14 BLK
702 – 14 BLK RED STR
935 – 16 DRK GREEN

6. Install temperature sender (part No. 14080661) in right cylinder head, Fig. 3.

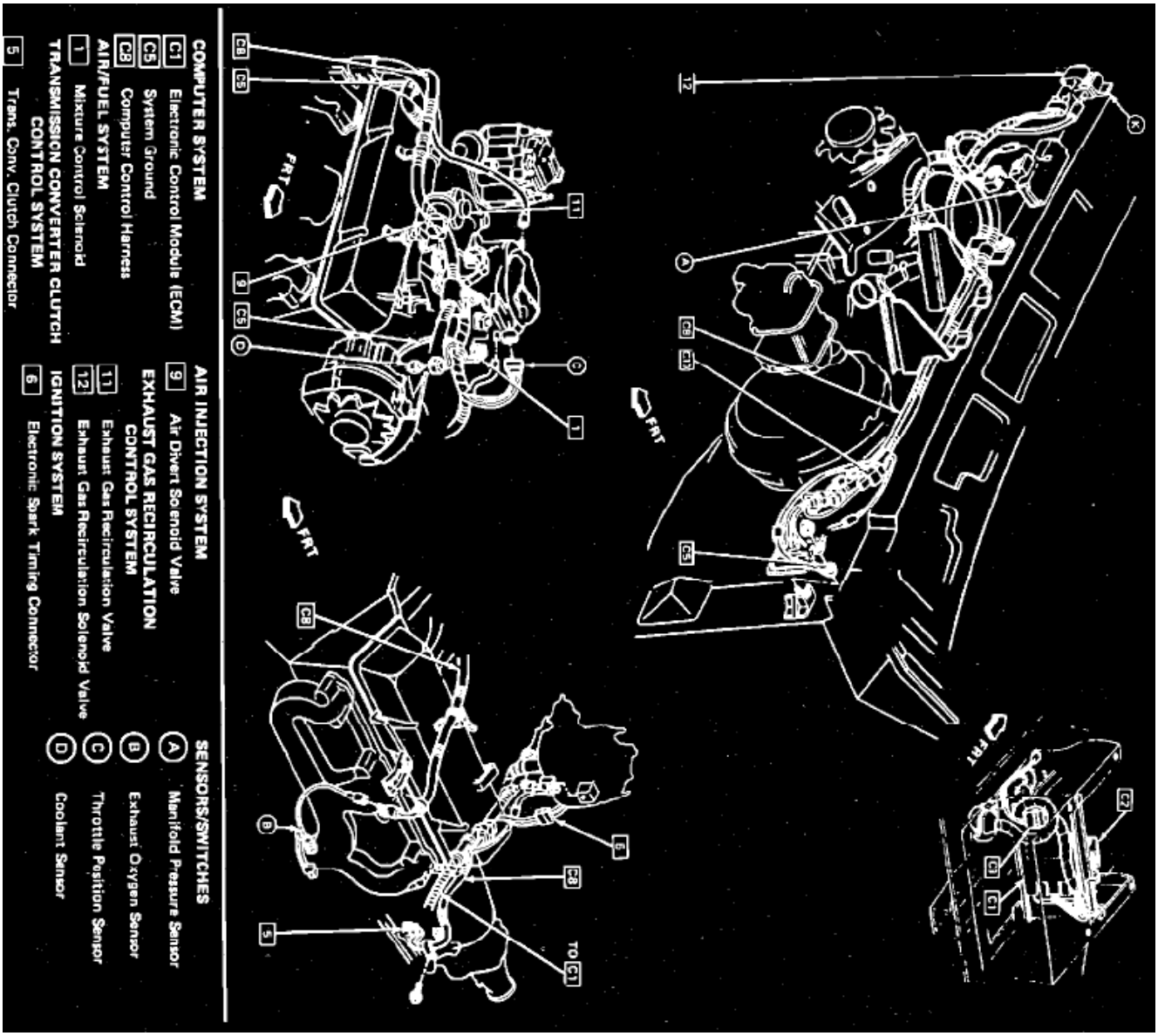
Fig. 4 Electric cooling fan wiring harness routing

Fig. 5 Electric cooling fan wiring circuit

7. Route and secure fan wiring harness as shown in Figs. 4 and 5.

8. Fill cooling system and connect battery ground cable.

9. Run engine and check for proper fan operation. Fan should be energized when engine temperature reaches approximately 225---240°F. Ensure fan blows air through radiator. If fan blows in opposite direction, reverse wires in fan electrical connector at motor.

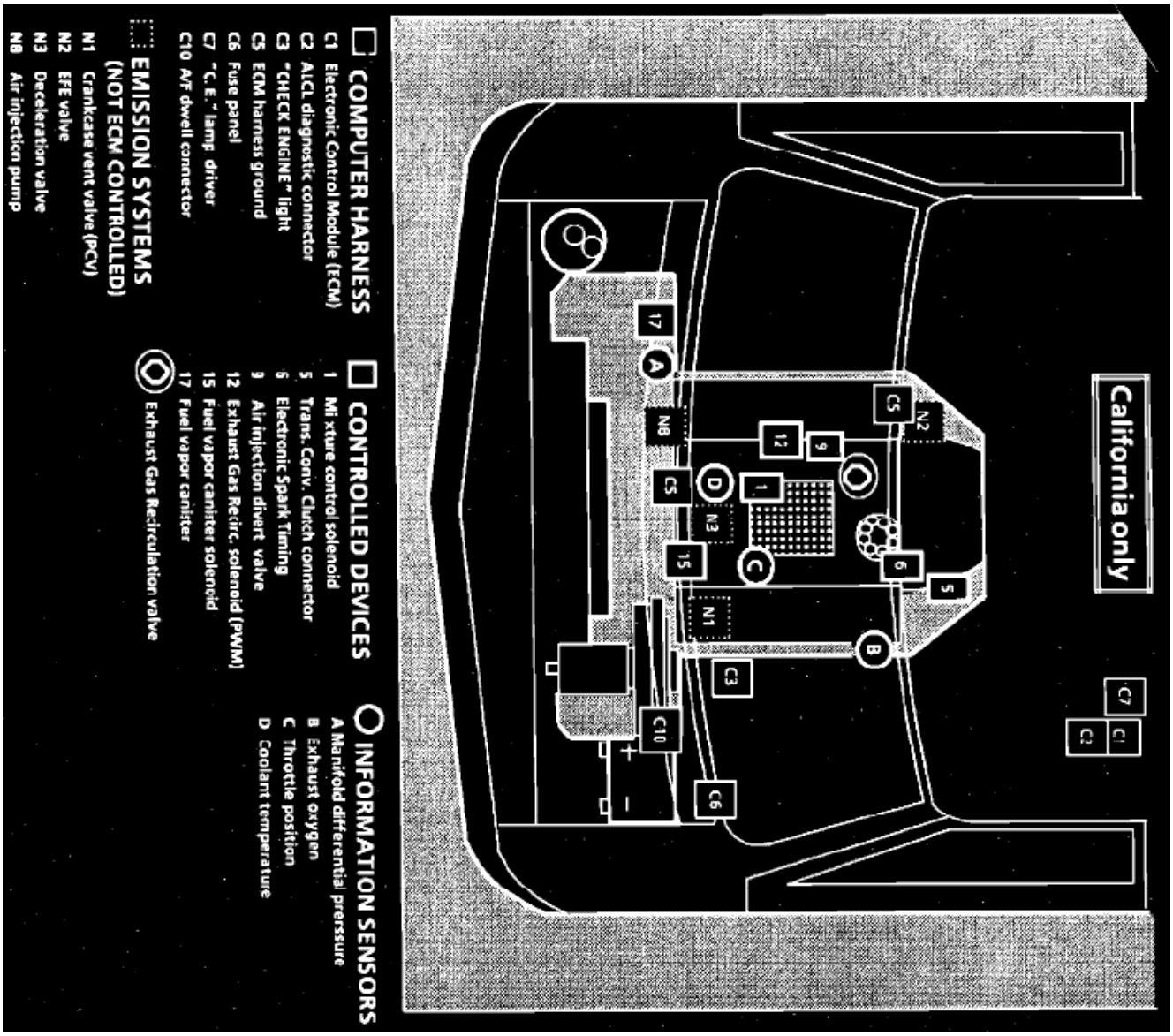


Radiator Cooling Fan Temperature Sensor / Switch: Locations Coolant Sensor

Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/V8



Radiator Cooling Fan Temperature Sensor / Switch: Locations Coolant Temperature Sensor

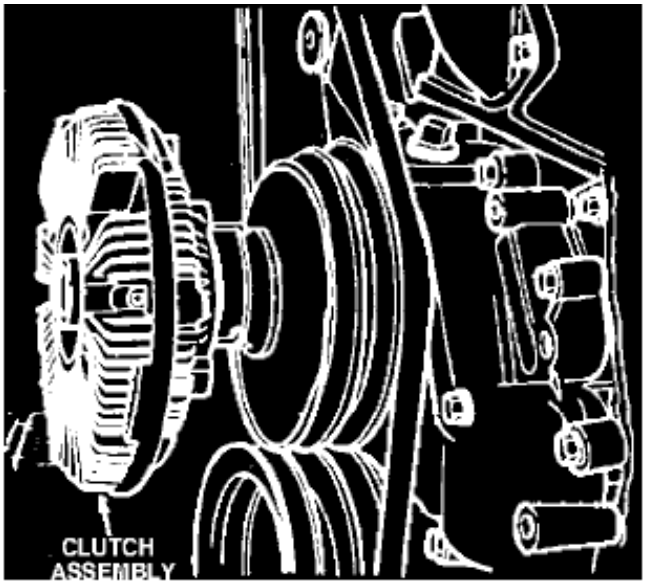
Underhood & Engine Components.

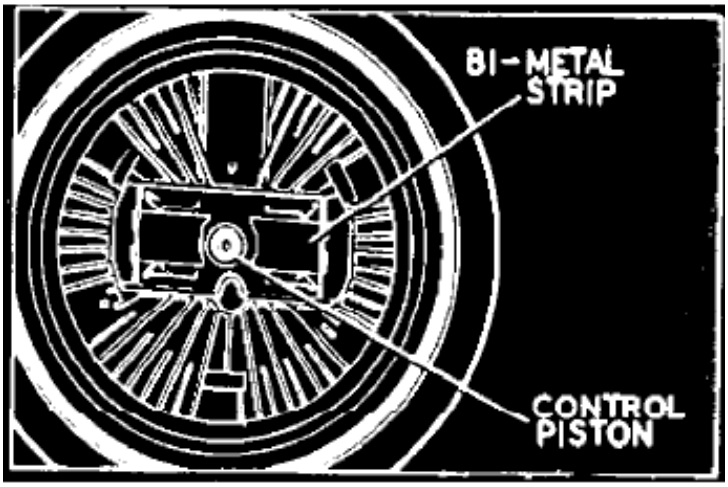
Top Front Of Engine

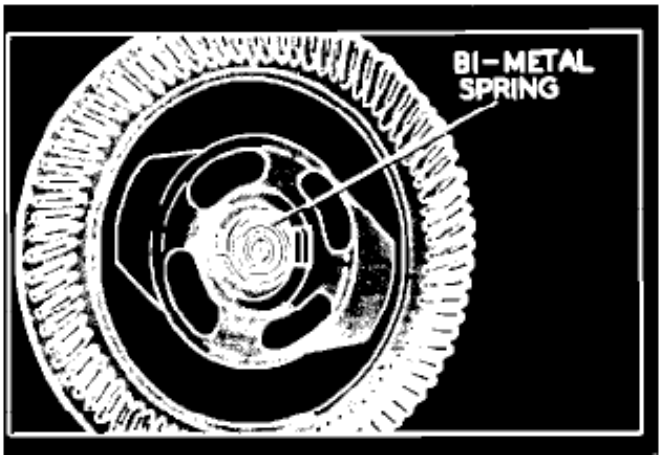
Applicable to: 1985 G Series w/5.0L & 5.7L California

Fan Blade: Service Precautions

Do not operate engine until fan has first been inspected for cracks and/or separations. If a fan blade is found to be bent or damaged in any way, do not attempt to repair or reuse damaged part. Proper balance is essential in fan assembly operation. Balance cannot be assured once a fan assembly has been found to be bent or damaged and failure may occur during operation, creating an extremely dangerous condition. Always replace damaged fan assembly.


CLUTCH
ASSEMBLY


BI-METAL
STRIP
CONTROL
PISTON


BI-METAL
SPRING

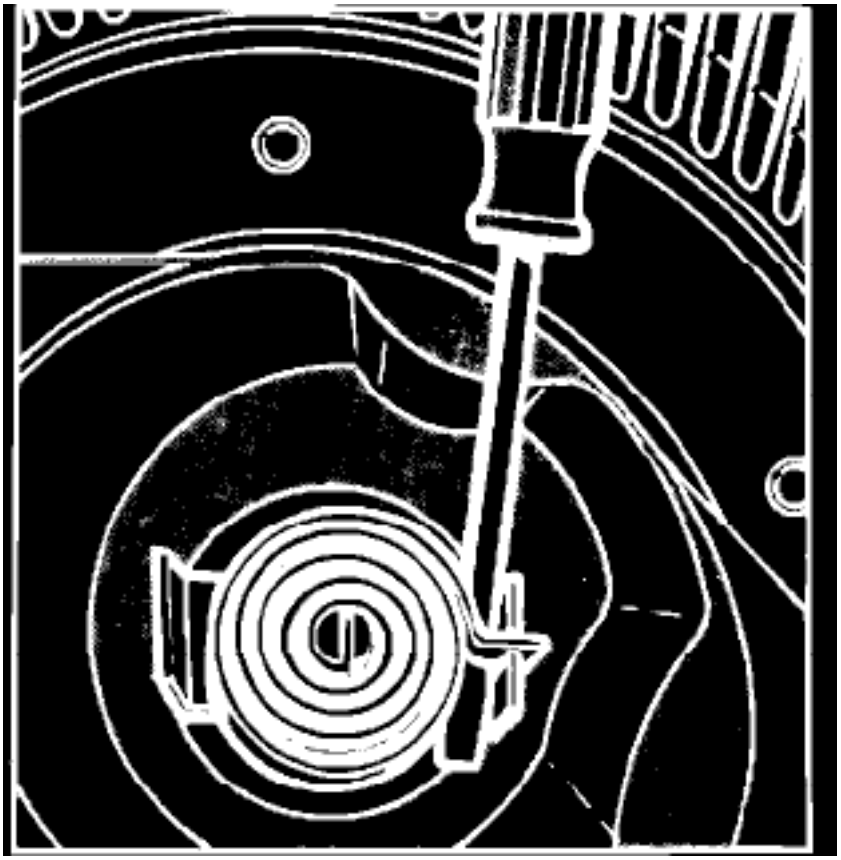
Fan Clutch: Description and Operation

Fig. 1 Fan drive clutch assembly, 1984---87. 1980---83 similar

Fig. 2 Variable speed fan with flat bimetallic thermostatic spring

Variable Speed Fan W/Bi-Metallic Coiled Thermostatic Spring

The fan drive clutch, Fig. 1, is a fluid coupling containing silicone oil. Fan speed is regulated by the torque-carrying capacity of the silicone oil. The more silicone oil in the coupling, the greater the fan speed, and the less silicone oil, the slower the fan speed. There are two types of fan drive clutches in use, one with a flat bimetallic thermostatic spring, Fig. 2, and the second with a coiled bimetallic thermostatic spring, Fig. 3. The fan drive clutch with the flat bimetallic spring works with a control piston on front of the fluid coupling to regulate the amount of silicone oil entering the coupling. The bimetallic strip bows outward with an increase in ambient temperature and allows a piston to move outward. This piston opens a valve regulating the flow of silicone oil into the coupling from a reserve chamber. The silicone oil is returned to the reserve chamber through a bleed hole when the valve is closed. The second fan drive clutch uses a heat-sensitive, coiled bimetallic spring connected to an opening plate which brings about similar results. Both units cause the fan speed to increase with a rise in temperature and to decrease as temperature decreases.



Fan Clutch: Testing and Inspection

Bi-Metallic Coiled Spring Removal

FAN DRIVE CLUTCH TEST Do not operate the engine until the fan has been first checked for possible cracks and separations. Run the engine at a fast idle speed (1000 RPM) until normal operating temperature is reached. This process can be speeded up by blocking off the front of the radiator with cardboard. Regardless of temperatures, the unit must be operated for at least five minutes immediately before being tested. Stop the engine and, using a glove or a cloth to protect the hand, immediately check the effort required to turn the fan. If considerable effort is required, it can be assumed that the coupling is operating satisfactorily. If very little effort is required to turn the fan, it is an indication that the coupling is not operating properly and should be replaced. If the clutch fan is the coiled bimetallic spring type, it may be tested while the vehicle is being driven. To check, disconnect the bimetal spring, Fig. 4, and rotate 90° counterclockwise. This disables the temperature-controlled, free-wheeling feature and the clutch performs like a conventional fan. If this cures the overheating condition, replace the clutch fan.

FAN CLUTCH NOISE Fan clutch noise can sometimes be noticed when clutch is engaged for maximum cooling. Clutch noise is also noticeable within the first few minutes after starting engine while clutch is redistributing the silicone fluid back to its normal, disengaged operating condition after settling for long periods of time (overnight). However, continuous fan noise or an excessive roar indicates the clutch assembly is locked-up due to internal failure. This condition can be checked by attempting to manually rotate fan. If fan cannot be rotated manually or there is a rough, abrasive feel as fan is rotated, the clutch should be replaced.

FAN LOOSENESS Lateral movement can be observed at the fan blade tip under various temperature conditions because of the type bearing used. This movement should not exceed 1/4 inch (6.5 mm) as measured at the fan tip. If this lateral movement does not exceed specifications, there is no cause for replacement.

CLUTCH FLUID LEAK Small fluid leaks do not generally affect the operation of the unit. These leaks generally occur around the area of the bearing assembly, but if the leaks appear to be excessive, engine overheating may occur. Check for clutch and fan free-wheeling by attempting to rotate fan and clutch assembly by hand five times. If no drag is felt, replace clutch.

FAN BLADE INSPECTION Place fan on flat surface with leading edge facing down. If there is a clearance between fan blade touching surface and opposite blade of more than .090 inch (2 mm), replace fan. (See caution at beginning of chapter.)

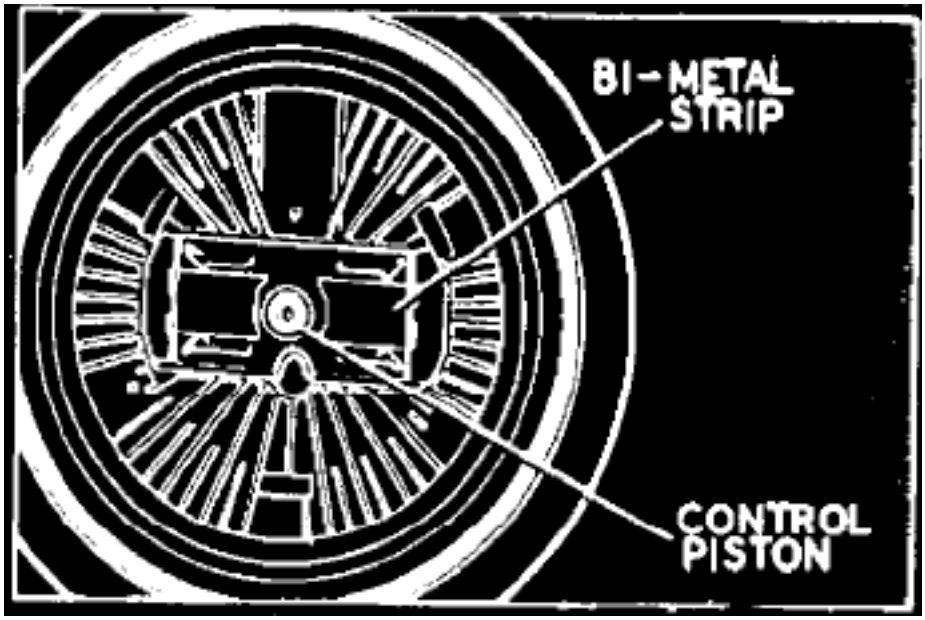


Fig. 2 Variable speed fan with flat bimetallic thermostatic spring

FAN SERVICE To prevent silicone fluid from draining into fan drive bearing, do not store or place drive unit on bench with rear of shaft pointing downward. The removal procedure for either type of fan clutch assembly is generally the same. Merely unfasten the unit from the water pump and remove the assembly from vehicle. The type of unit shown in Fig. 2, may be partially disassembled for inspection and cleaning. Remove capscrews that hold the assembly together and separate the fan from the drive clutch. Next, remove metal strip on front of clutch assembly by pushing one end of it toward the fan clutch body so it clears the retaining bracket. Push the strip to the side so that its opposite end will spring out of place. Now remove the small control piston underneath it. Check the piston for free movement of the coupling device. If piston sticks, clean it with emery cloth. If the bimetal strip is damaged, replace the entire unit. These strips are not interchangeable. When reassembling, install the control piston so that the projection on the end of it will contact the metal strip. Next install metal strip with any identification number or letters facing the clutch. After reassembly, clean the clutch drive assembly with a cloth soaked in a suitable solvent. Avoid dipping the clutch assembly in any type liquid. Install the assembly in the reverse order of removal. The coil spring type fan clutch cannot be disassembled, serviced or repaired. If it does not function properly, it must be replaced with a new unit.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

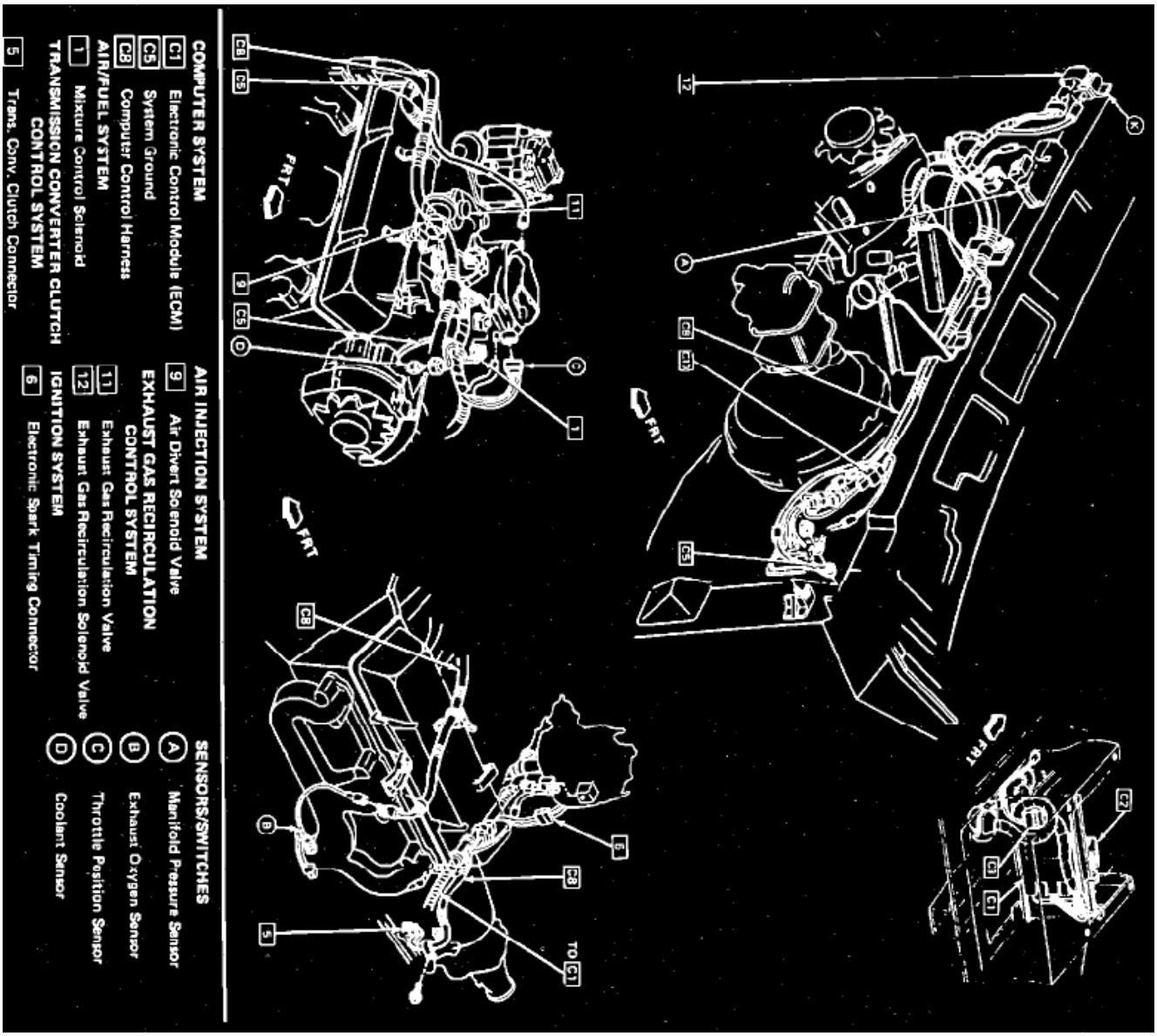
Coolant Temperature Sensor/Switch (For Computer): Description and Operation

The coolant temperature sensor supplies coolant temperature information to the ECM. It is mounted in the engine coolant stream and has high resistance when the engine is cold and low resistance when the engine is warm. The ECM receives this information and controls the various systems that are dependent on temperature for proper operation.

Coolant Temperature Sensor/Switch (For Computer): Service and Repair

1. Disconnect electrical connector and remove sensor.
2. Reverse procedure to install. Torque sensor to 72 in lbs.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Engine, Cooling and Exhaust > Cooling System > Engine - Coolant Temperature Sensor/Switch > Radiator Cooling Fan Temperature Sensor / Switch > Component Information > Locations > Coolant Sensor

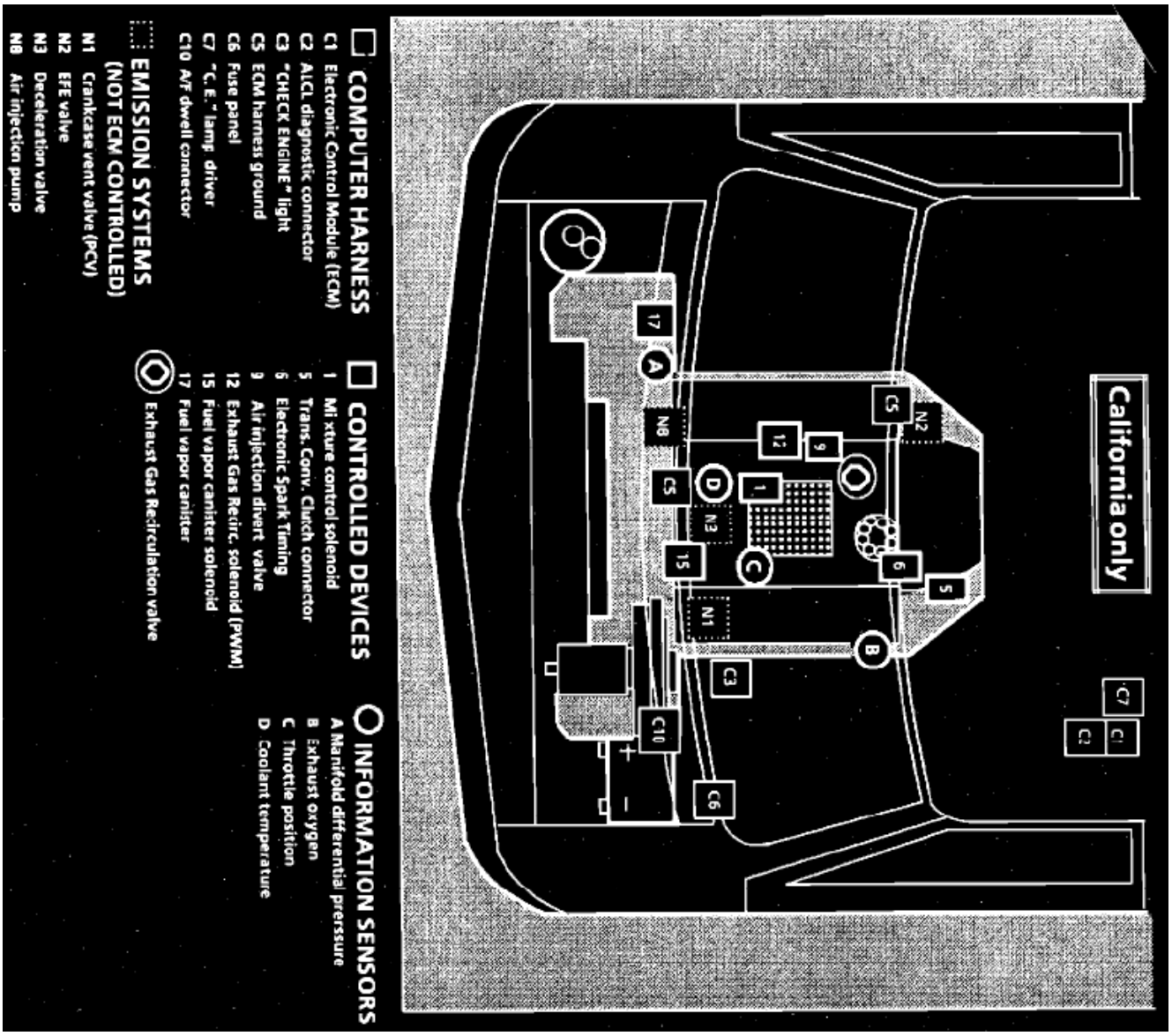


Radiator Cooling Fan Temperature Sensor / Switch: Locations Coolant Sensor

Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/V8



Radiator Cooling Fan Temperature Sensor / Switch: Locations Coolant Temperature Sensor

Underhood & Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

Heater Core: Technical Service Bulletins Cooling System, A/C - Aluminum Heater Cores/Radiators

INFORMATION

Bulletin No.: 05-06-02-001A

Date: July 16, 2008

Subject: Information On Aluminum Heater Core and/or Radiator Replacement

Models: 2005 and Prior GM Passenger Cars and Light Duty Trucks (including Saturn) 2003-2005 HUMMER H2

Supercede:

This bulletin is being revised to update the Warranty Information. Please discard Corporate Bulletin Number 05-06-02-001 (Section 06 - Engine/Propulsion System).

Important:

2004-05 Chevrolet Aveo (Pontiac Wave, Canada Only) does not use DEX-COOL(R). Refer to the flushing procedure explained later in this bulletin.

The following information should be utilized when servicing aluminum heater core and/or radiators on repeat visits. A replacement may be necessary because erosion, corrosion, or insufficient inhibitor levels may cause damage to the heater core, radiator or water pump. A coolant check should be performed whenever a heater core, radiator, or water pump is replaced. The following procedures/ inspections should be done to verify proper coolant effectiveness.

Caution:

To avoid being burned, do not remove the radiator cap or surge tank cap while the engine is hot. The cooling system will release scalding fluid and steam under pressure if the radiator cap or surge tank cap is removed while the engine and radiator are still hot.

Important:

If the vehicle's coolant is low, drained out, or the customer has repeatedly added coolant or water to the system, then the system should be completely flushed using the procedure explained later in this bulletin.

Technician Diagnosis

^ Verify coolant concentration. A 50% coolant/water solution ensures proper freeze and corrosion protection. Inhibitor levels cannot be easily measured in the field, but can be indirectly done by the measurement of coolant concentration. This must be done by using a Refractometer J 23688 (Fahrenheit scale) or J 26568 (centigrade scale), or equivalent, coolant tester. The Refractometer uses a minimal amount of coolant that can be taken from the coolant recovery reservoir, radiator or the engine block. Inexpensive gravity float testers (floating balls) will not completely analyze the coolant concentration fully and should not be used. The concentration levels should be between 50% and 65% coolant concentrate. This mixture will have a freeze point protection of -34 degrees Fahrenheit (-37 degrees Celsius). If the concentration is below 50%, the cooling system must be flushed.

^ Inspect the coolant flow restrictor if the vehicle is equipped with one. Refer to Service Information (SI) and/or the appropriate Service Manual for component location and condition for operation.

^ Verify that no electrolysis is present in the cooling system. This electrolysis test can be performed before or after the system has been repaired. Use a digital voltmeter set to 12 volts. Attach one test lead to the negative battery post and insert the other test lead into the radiator coolant, making sure

the lead does not touch the filler neck or core. Any voltage reading over 0.3 volts indicates that stray current is finding its way into the coolant. Electrolysis is often an intermittent condition that occurs when a device or accessory that is mounted to the radiator is energized. This type of current could be caused from a poorly grounded cooling fan or some other accessory and can be verified by watching the volt meter and turning on and off various accessories or engage the starter motor. Before using one of the following flush procedures, the coolant recovery reservoir must be removed, drained, cleaned and reinstalled before refilling the system.

Notice:

^ Using coolant other than DEX‐COOL(R) may cause premature engine, heater core or radiator corrosion. In addition, the engine coolant may require changing sooner, at 30,000 miles (50,000 km) or 24 months, whichever occurs first. Any repairs would not be covered by your warranty. Always use DEX‐COOL(R) (silicate free) coolant in your vehicle.

^ If you use an improper coolant mixture, your engine could overheat and be badly damaged. The repair cost would not be covered by your warranty. Too much water in the mixture can freeze and crack the engine, radiator, heater core and other parts.

Part Number	Description
12346290 (in Canada, 10953464)	Coolant, Extended Life (DEX-COOL®)
12378560 (in Canada, 88862159)	Coolant, Conventional (Green Colored) 1 gal. (in Canada 1 L)

Flushing Procedures using DEX-COOL(R)

Important:

The following procedure recommends refilling the system with DEX-COOL(R), P/N 12346290 (in Canada, use P/N 10953464), GM specification 6277M. This coolant is orange in color and has a service interval of 5 years or 240,000 km (150,000 mi). However, when used on vehicles built prior to the introduction of DEX-COOL(R), maintenance intervals will remain the same as specified in the Owner's Manual.

^ If available, use the approved cooling system flush and fill machine (available through the GM Dealer Equipment Program) following the manufacturer's operating instructions.

^ If approved cooling system flush and fill machine is not available, drain the coolant and dispose of properly following the draining procedures in the appropriate Service Manual. Refill the system using clear, drinkable water and run the vehicle until the thermostat opens. Repeat and run the vehicle three (3) times to totally remove the old coolant or until the drained coolant is almost clear. Once the system is completely flushed, refill the cooling system to a 50%-60% concentration with DEX‐COOL(R), P/N 12346290 (in Canada, use P/N 10953464), GM specification 6277M, following the refill procedures in the appropriate Service Manual.

If a Service Manual is not available, fill half the capacity of the system with 100% DEX-COOL(R), P/N 12346290 (in Canada, use P/N 10953464), GM specification 6277M. Then slowly add clear, drinkable water (preferably distilled) to the system until the level of the coolant mixture has reached the base of the radiator neck. Wait two (2) minutes and reverify the coolant level. If necessary, add clean water to restore the coolant to the appropriate level.

Once the system is refilled, reverify the coolant concentration using a Refractometer J 23688 (Fahrenheit scale) or J 26568 (centigrade scale) coolant tester, or equivalent. The concentration levels should be between 50% and 65%.

Flushing Procedures using Conventional Silicated (Green Colored) Coolant

Important:

2004-2005 Chevrolet Aveo (Pontiac Wave, Canada Only) does not use DEX‐COOL(R). The Aveo and Wave are filled with conventional, silicated engine coolant that is blue in color. Silicated coolants are typically green in color and are required to be drained, flushed and refilled every 30,000 miles (48,000 km). The Aveo and Wave are to be serviced with conventional, silicated coolant. Use P/N 12378560 (1 gal) (in Canada, use P/N 88862159 (1 L). Refer to the Owner's Manual or Service Information (SI) for further information on OEM coolant.

Important:

Do not mix the OEM orange colored DEX-COOL(R) coolant with green colored coolant when adding coolant to the system or when servicing the vehicle's cooling system. Mixing the orange and green colored coolants will produce a brown coolant which may be a customer dissatisfier and will not extend the service interval to that of DEX-COOL(R). Conventional silicated coolants offered by GM Service and Parts Operations are green in color.

^ If available, use the approved cooling system flush and fill machine (available through the GM Dealer Equipment Program) following the manufacturer's operating instructions.

^ If approved cooling systems flush and fill machine is not available, drain coolant and dispose of properly following the draining procedures in appropriate Service Manual. Refill the system using clear, drinkable water and run vehicle until thermostat opens. Repeat and run vehicle three (3) times to totally remove old coolant or until drained coolant is almost clear. Once the system is completely flushed, refill the cooling system to a 50%-60% concentration with a good quality ethylene glycol base engine coolant, P/N 12378560, 1 gal (in Canada, use P/N 88862159 1 L), conforming to GM specification 1825M, or recycled coolant conforming to GM specification 1825M, following the refill procedures in the appropriate Service Manual.

If a Service Manual is not available, fill half the capacity of the system with 100% good quality ethylene glycol base (green colored) engine coolant, P/N 12378560 1 gal., (in Canada, use P/N 88862159 1 L) conforming to GM specification 1825M. Then slowly add clear, drinkable water (preferably distilled) to system until the level of the coolant mixture has reached the base of the radiator neck. Wait two (2) minutes and recheck coolant level. If necessary, add clean water to restore coolant to the appropriate level.

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Parts Information

Warranty Information

Labor Operation	Description	Labor Time
J 3100	Radiator Assembly – Replace	Use Published Labor Operation Time
J 3250	Radiator Surge Tank – Replace	Use Published Labor Operation Time
J 3523	Cord, Engine Coolant Heater – Replace	Use Published Labor Operation Time
J 3524	Heater, Engine Coolant – Replace	Use Published Labor Operation Time
J 3540	Cooling System – Flush	Use Published Labor Operation Time

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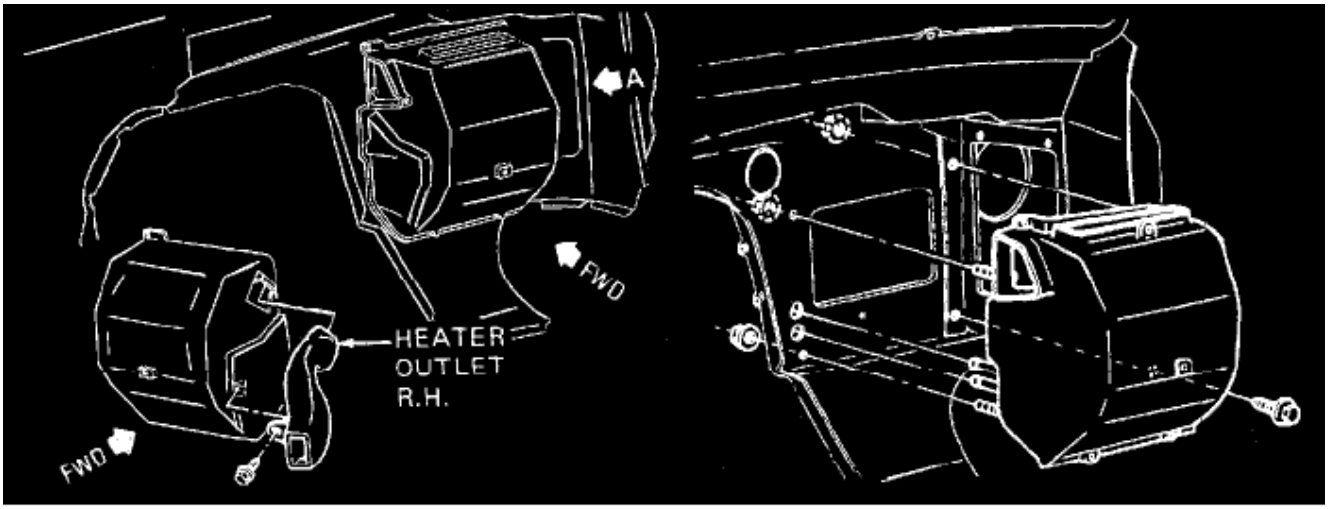
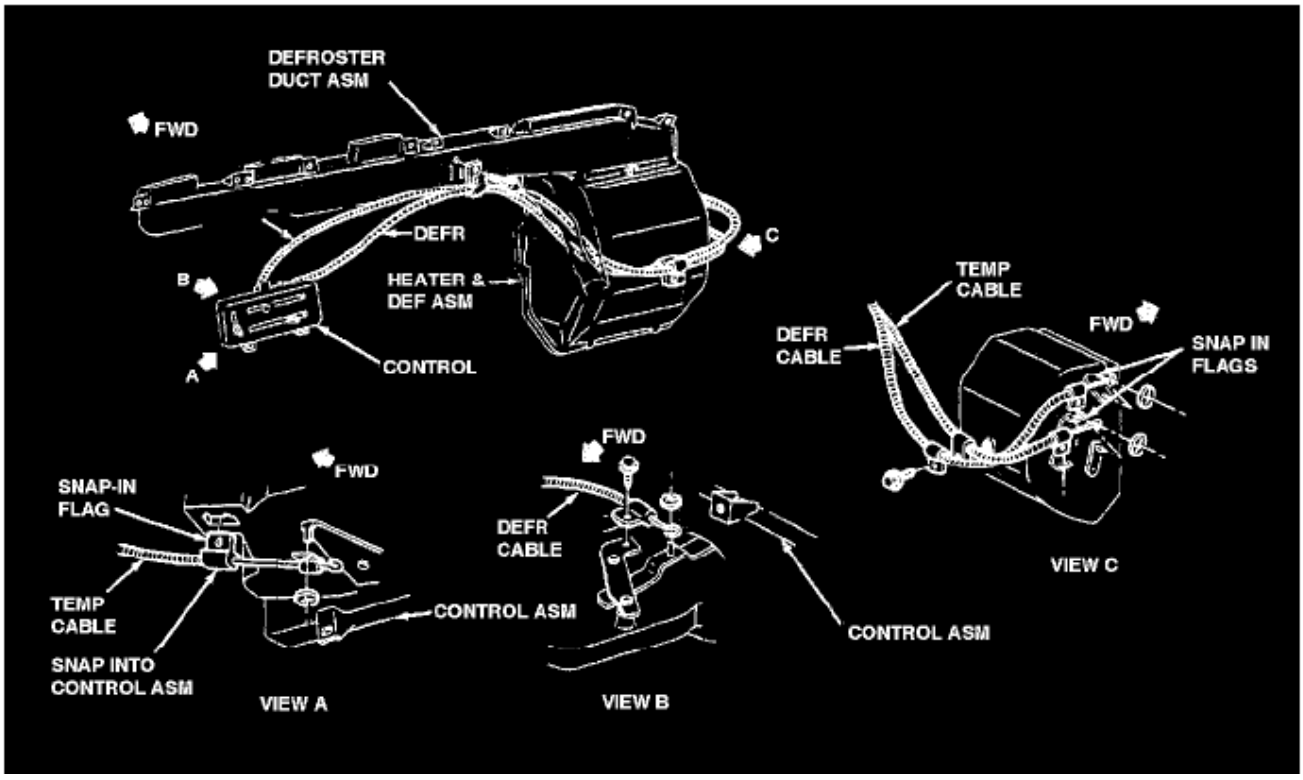
WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

For vehicles repaired under warranty, use the table.

Disclaimer





Heater Core: Service and Repair

Replacement

1. Disconnect the battery cable. 2. Remove coolant recovery tank and lay aside. 3. Place a clean pan under the vehicle and then disconnect the heater core inlet and outlet hoses at the heater connections. Quickly plug the heater

hoses and support them in a raised position. Allow the coolant in the heater core to drain into the pan on the floor.

4. Remove heater distributor duct to distributor case attaching screws and distributor duct to engine cover screw and remove duct. 5. Remove engine housing cover. 6. Remove instrument panel attaching screws: above, at windshield, all lower screws and right lower I.P. support bracket at door pillar and engine

housing.

7. Lower steering column, and raise and support right side of I.P. 8. Remove defroster duct to distributor case attaching distributor to heater case. 9. Disconnect temperature door cable and fold cable back for access.

10. Remove three (3) nuts at engine compartment side of distributor case and one (1) screw on passenger side. 11. Remove the heater case and core as an assembly. Tilt the case assembly rearward at the top while lifting up until the core tubes clear the dash

openings.

12. Remove the core retaining strap screws and remove the core. 13. To install a new core, reverse Steps 1-10 above. Be sure core to case and case to dash panel sealer is intact before assembling unit.

Coolant Level Indicator Lamp: Service and Repair

This lamp will be illuminated when engine coolant level in the radiator drops below a pre-determined level. To turn lamp "OFF," check cooling system, then add coolant to bring system to proper level.

Temperature Warning Lamp/Indicator: Testing and Inspection

A bimetal temperature switch located in the cylinder head controls the operation of a temperature indicator light with a red lens. If the engine cooling system is not functioning properly and coolant temperature exceeds a predetermined value, the warning light will illuminate.

TROUBLESHOOTING If the red light is not lit when the engine is being cranked, check for a burned out bulb, an open in the light circuit, or a defective ignition switch. If the red light is lit when the engine is running, check the wiring between light and switch for a ground, defective temperature switch, or overheated cooling system. As a test circuit to check whether the red bulb is functioning properly, a wire which is connected to the ground terminal of the ignition switch is tapped into its circuit. When the ignition is in the ``Start'' (engine cranking) position, the ground terminal is grounded inside the switch and the red bulb will be lit. When the engine is started and the ignition switch is in the ``On'' position, the test circuit is opened and the bulb is then controlled by the temperature switch.

Radiator: Technical Service Bulletins Cooling System, A/C - Aluminum Heater Cores/Radiators

INFORMATION

Bulletin No.: 05-06-02-001A

Date: July 16, 2008

Subject: Information On Aluminum Heater Core and/or Radiator Replacement

Models: 2005 and Prior GM Passenger Cars and Light Duty Trucks (including Saturn) 2003-2005 HUMMER H2

Supercede:

This bulletin is being revised to update the Warranty Information. Please discard Corporate Bulletin Number 05-06-02-001 (Section 06 - Engine/Propulsion System).

Important:

2004-05 Chevrolet Aveo (Pontiac Wave, Canada Only) does not use DEX-COOL(R). Refer to the flushing procedure explained later in this bulletin.

The following information should be utilized when servicing aluminum heater core and/or radiators on repeat visits. A replacement may be necessary because erosion, corrosion, or insufficient inhibitor levels may cause damage to the heater core, radiator or water pump. A coolant check should be performed whenever a heater core, radiator, or water pump is replaced. The following procedures/ inspections should be done to verify proper coolant effectiveness.

Caution:

To avoid being burned, do not remove the radiator cap or surge tank cap while the engine is hot. The cooling system will release scalding fluid and steam under pressure if the radiator cap or surge tank cap is removed while the engine and radiator are still hot.

Important:

If the vehicle's coolant is low, drained out, or the customer has repeatedly added coolant or water to the system, then the system should be completely flushed using the procedure explained later in this bulletin.

Technician Diagnosis

^ Verify coolant concentration. A 50% coolant/water solution ensures proper freeze and corrosion protection. Inhibitor levels cannot be easily measured in the field, but can be indirectly done by the measurement of coolant concentration. This must be done by using a Refractometer J 23688 (Fahrenheit scale) or J 26568 (centigrade scale), or equivalent, coolant tester. The Refractometer uses a minimal amount of coolant that can be taken from the coolant recovery reservoir, radiator or the engine block. Inexpensive gravity float testers (floating balls) will not completely analyze the coolant concentration fully and should not be used. The concentration levels should be between 50% and 65% coolant concentrate. This mixture will have a freeze point protection of -34 degrees Fahrenheit (-37 degrees Celsius). If the concentration is below 50%, the cooling system must be flushed.

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12378560 (in Canada, 88862159)	Coolant, Conventional (Green Colored) 1 gal. (in Canada 1 L)

Flushing Procedures using DEX-COOL(R)

Important:

The following procedure recommends refilling the system with DEX-COOL(R), P/N 12346290 (in Canada, use P/N 10953464), GM specification 6277M. This coolant is orange in color and has a service interval of 5 years or 240,000 km (150,000 mi). However, when used on vehicles built prior to the introduction of DEX-COOL(R), maintenance intervals will remain the same as specified in the Owner's Manual.

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Parts Information

Warranty Information

Labor Operation	Description	Labor Time
J 3100	Radiator Assembly – Replace	Use Published Labor Operation Time
J 3250	Radiator Surge Tank – Replace	Use Published Labor Operation Time
J 3523	Cord, Engine Coolant Heater – Replace	Use Published Labor Operation Time
J 3524	Heater, Engine Coolant – Replace	Use Published Labor Operation Time
J 3540	Cooling System – Flush	Use Published Labor Operation Time

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Disclaimer

Radiator: Technical Service Bulletins Cooling - Radiator Repair/Replacement Guidelines

File In Section: 06 - Engine/Propulsion System

Bulletin No.: 99-06-02-017

Date: October, 1999

INFORMATION

Subject: Radiator Repair/Replacement Guidelines

Models: 2000 and Prior Passenger Cars and Trucks

If repair of an aluminum/plastic radiator is required, it is recommended that the following guidelines be followed:

For Vehicles Under Warranty

For aluminum/plastic radiators that have damage to the face of the core including bent fins, punctures, cuts, leaking tubes or header tubes, the aluminum radiator core section should be replaced with a new one. In these cases, if both of the plastic tanks are not damaged, they can be reused with the new core. If one or both of the plastic tanks are damaged along with the core, it is recommended that a complete new radiator assembly be installed.

Warranty repairs for leaks at the tank to header (gasket leaks), broken/cracked plastic tanks, cross threaded or leaking oil coolers should be repaired without replacing the complete radiator. This type of repair should be handled by the radiator repair facility in your area.

Many of these radiator repair facilities are members of the National Automotive Radiator Service Association (NARSA) who follow industry and General Motors guidelines when repairing radiators. These facilities have the special tools, tanks and pressurizing equipment needed to properly test the repaired radiator prior to returning it to the dealership. Many of these facilities receive the repair components directly from General Motors.

The sublet expense for a new radiator or the repair of the radiator under warranty should be handled following normal procedures.

For Vehicles No Longer Under Warranty

The GM released epoxy repair kit referenced in previous publications is no longer available. Repairs to the radiator, rather than replacement, is strictly at the owner's discretion.

Radiator Cap: Specifications

Release Pressure 15 psi

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

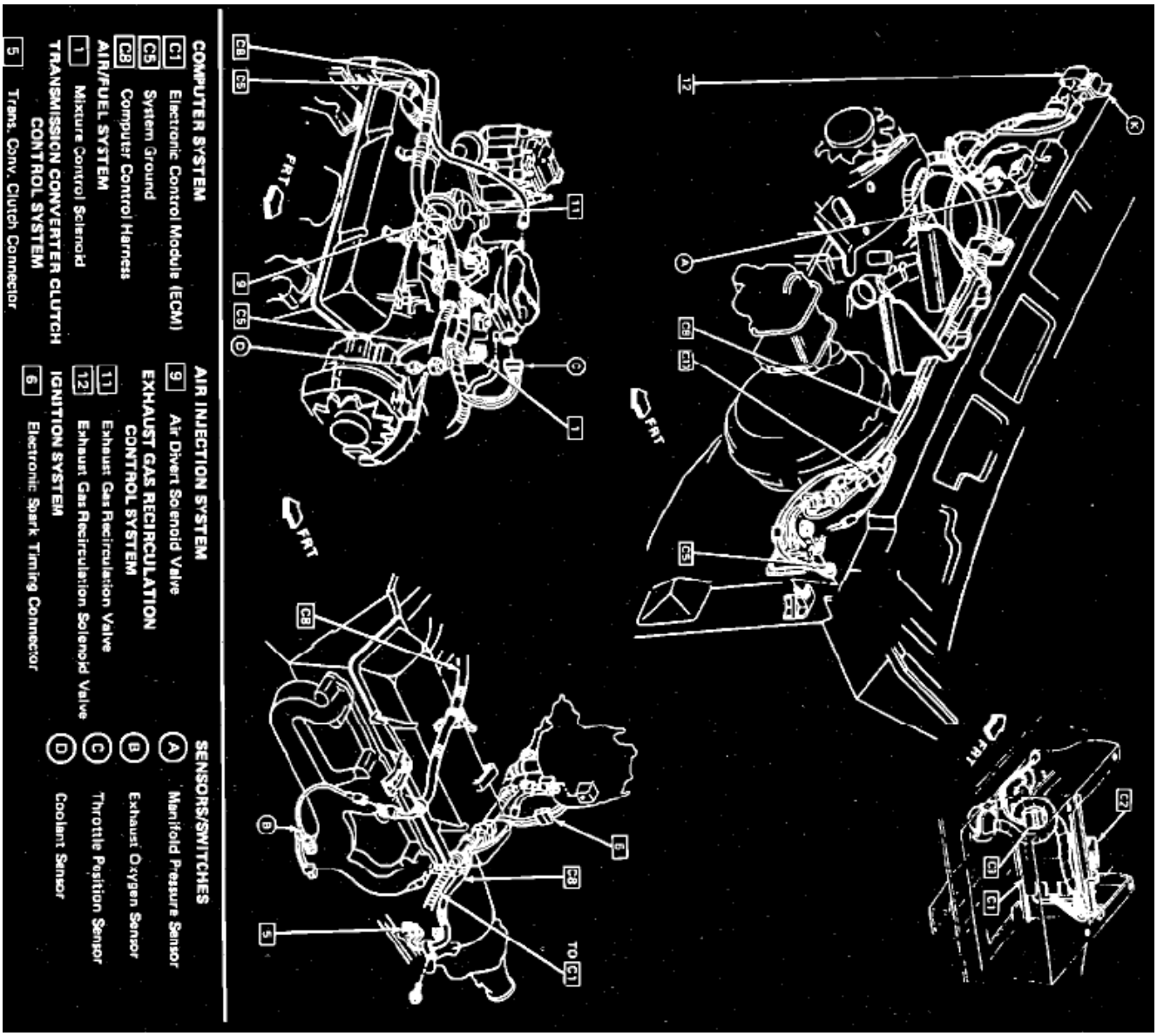
TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

The coolant temperature sensor supplies coolant temperature information to the ECM. It is mounted in the engine coolant stream and has high resistance when the engine is cold and low resistance when the engine is warm. The ECM receives this information and controls the various systems that are dependent on temperature for proper operation.

Coolant Temperature Sensor/Switch (For Computer): Service and Repair

1. Disconnect electrical connector and remove sensor.
2. Reverse procedure to install. Torque sensor to 72 in lbs.

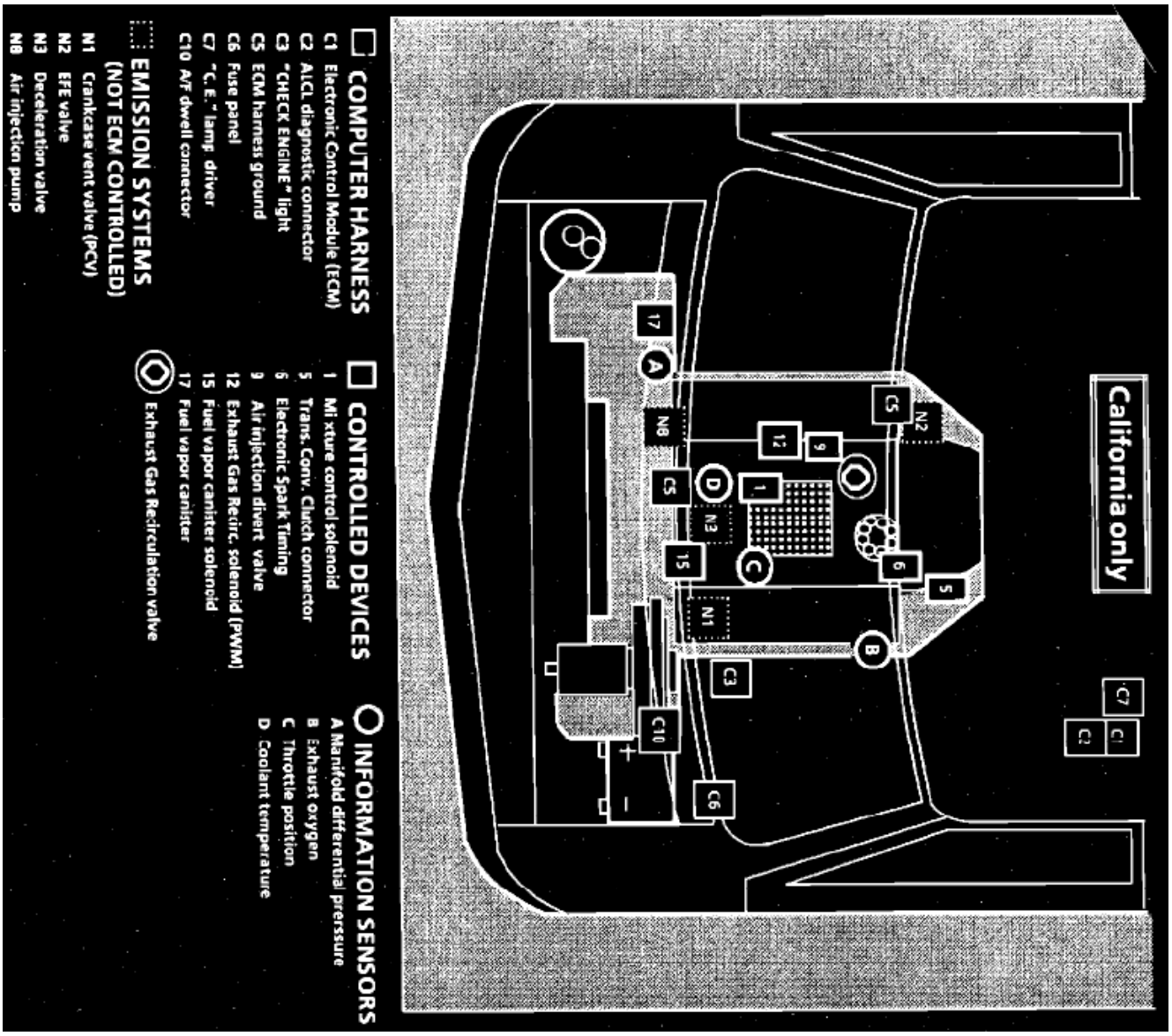


Radiator Cooling Fan Temperature Sensor / Switch: Locations Coolant Sensor

Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/V8



Radiator Cooling Fan Temperature Sensor / Switch: Locations Coolant Temperature Sensor

Underhood & Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

Temperature Warning Lamp/Indicator: Testing and Inspection

A bimetal temperature switch located in the cylinder head controls the operation of a temperature indicator light with a red lens. If the engine cooling system is not functioning properly and coolant temperature exceeds a predetermined value, the warning light will illuminate.

TROUBLESHOOTING If the red light is not lit when the engine is being cranked, check for a burned out bulb, an open in the light circuit, or a defective ignition switch. If the red light is lit when the engine is running, check the wiring between light and switch for a ground, defective temperature switch, or overheated cooling system. As a test circuit to check whether the red bulb is functioning properly, a wire which is connected to the ground terminal of the ignition switch is tapped into its circuit. When the ignition is in the ``Start'' (engine cranking) position, the ground terminal is grounded inside the switch and the red bulb will be lit. When the engine is started and the ignition switch is in the ``On'' position, the test circuit is opened and the bulb is then controlled by the temperature switch.

Thermostat: Specifications

Opening Temperature 195 F

Water Pump: Service and Repair

EXC. V6-231

1. Drain cooling system.

2. Remove fan belt and fan.

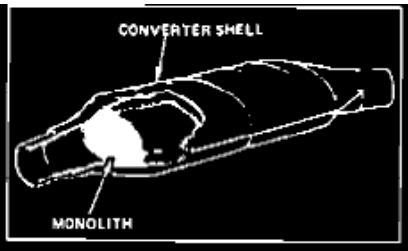
3. Disconnect all hoses from water pump.

4. Remove alternator upper and lower mounting braces, if necessary.

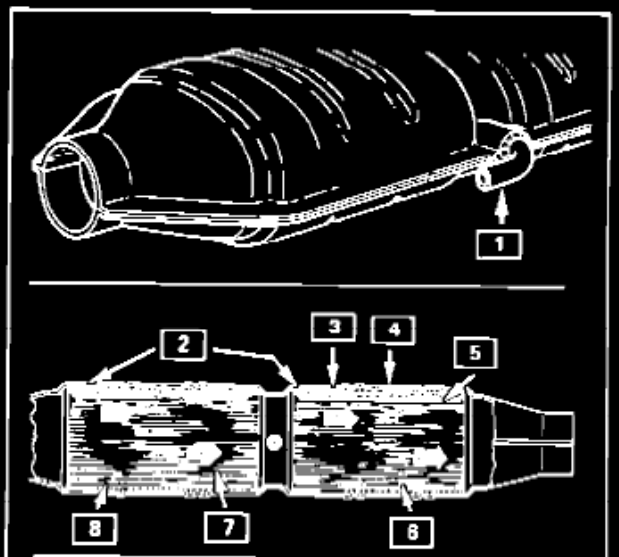
5. Remove pump attaching bolts and remove water pump. On 6-250 engines, pull pump straight out of block to prevent damage to impeller.

6. Reverse procedure to install.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Engine, Cooling and Exhaust > Exhaust System > Catalytic Converter > Component Information > Description and Operation

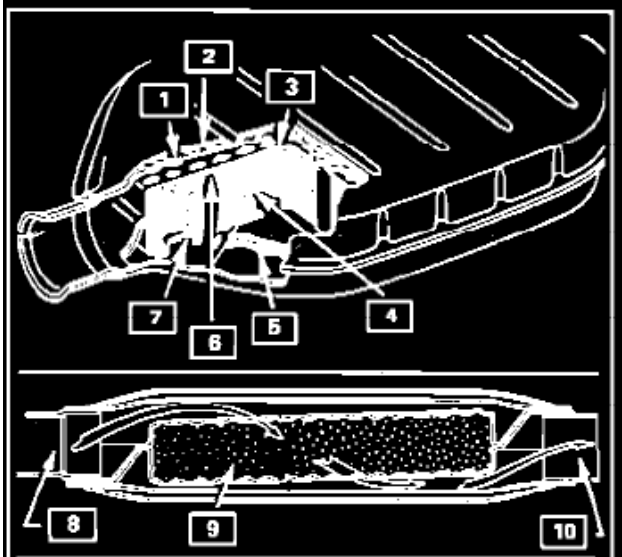


SINGLE BED MONOLITH



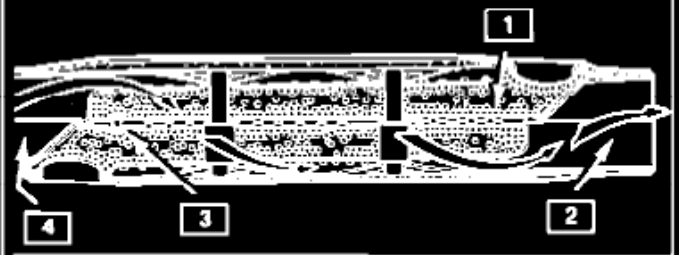
1—AIR MANAGEMENT SYSTEM AIR INLET
2—SEAL
3—METAL MESH
4—SHELL
5—OXIDATION CATALYST
6—REAR BED
7—THREE-WAY CATALYST
8—FRONT BED

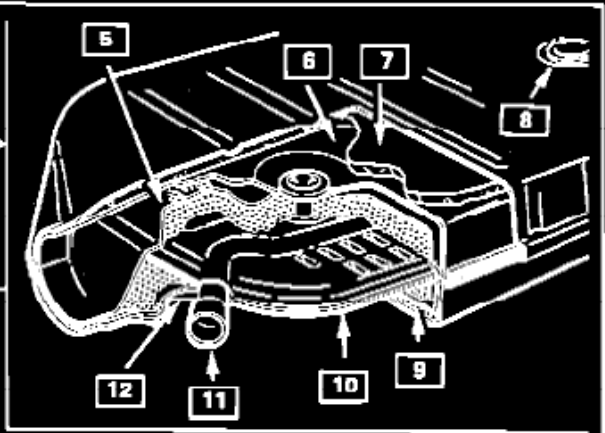
DUAL BED MONOLITH



1— INSULATION
2— OUTER WRAP
3— CONVERTER SHELL
4— CATALYST
5— INSULATION
6— BED SUPPORT
7— FILL PLUG
8— INLET GAS
9— CATALYTIC PELLET COMPOUND
10— OUTLET GAS

SINGLE BED PELLET





1— THREE-WAY CATALYST
2— OUTLET
3— OXIDATION CATALYST
4— INLET
5— RETAINER
6— CONVERTER SHELL
7— INSULATION
8— FILL PLUG
9— INSULATION
10— AIR PLENUM
11— AIR INLET (AIR MANAGEMENT SYSTEM)
12— FILL PLUG

DUAL BED PELLET

Catalytic Converter: Description and Operation

Catalytic Converters

DESCRIPTION

The catalytic converter is an emission control device added to the exhaust system to effectively reduce the levels of carbon monoxide, hydrocarbons, and in some cases oxides of nitrogen, entering the atmosphere.

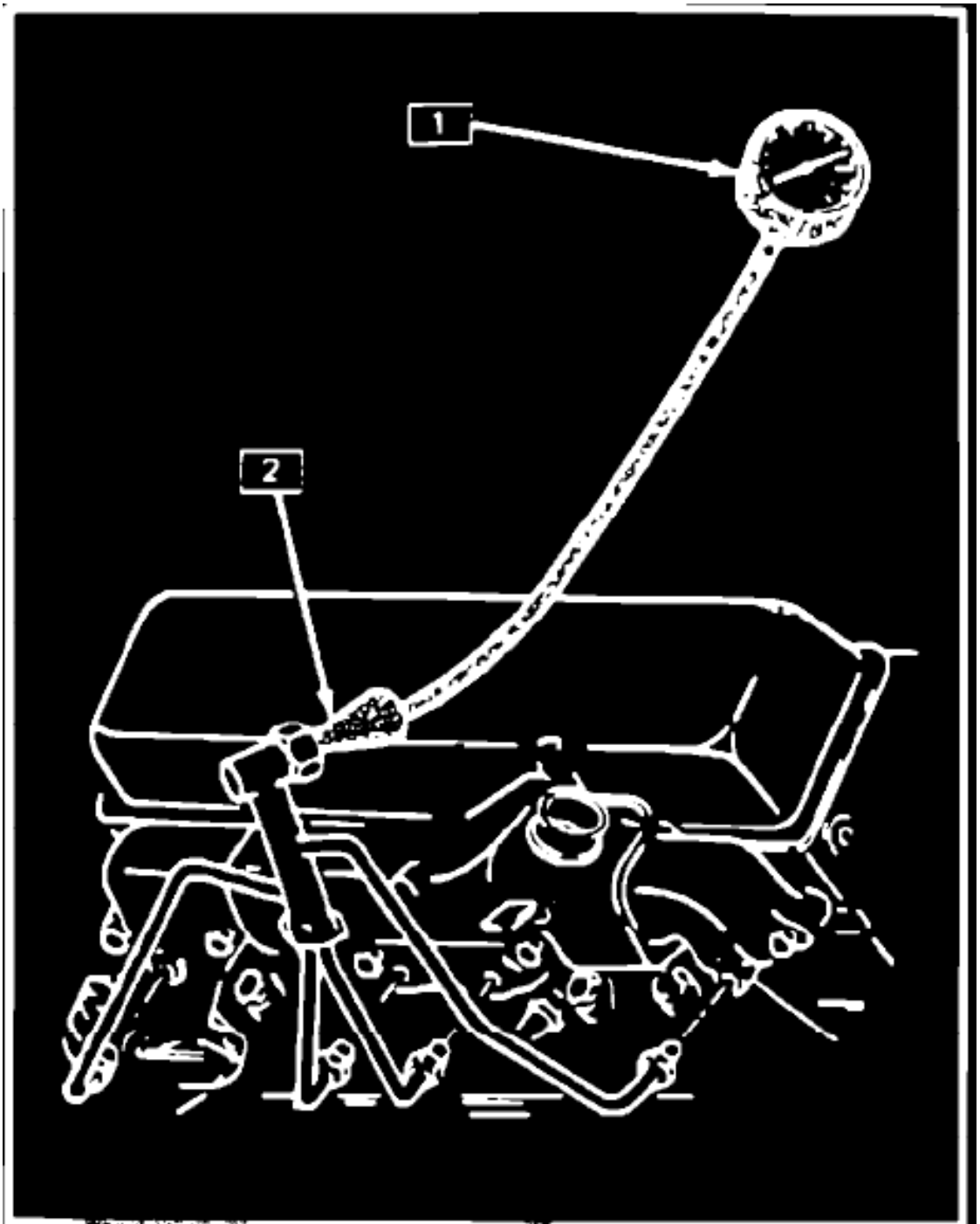
The converter serves two purposes: it permits a faster chemical reaction to take place and although it enters into the chemical reaction, it remains unchanged, ready to repeat the process.

This device sometimes requires the use of heat shields, due to its high operating temperatures. The heat shields are necessary to protect chassis components, passenger compartment and other areas from heat related damage.

General Motors uses four different converter designs in conjunction with two types of catalysts. The four converter designs are: single bed monolith, dual bed monolith, single bed pellet and dual bed pellet. The two types of catalysts used are an oxidation catalyst and a three way (reduction) catalyst.

The oxidation catalyst is coated with material containing platinum and palladium which lowers levels of carbon monoxide and hydrocarbons. The three way (reduction) catalyst is coated with platinum and rhodium which lowers levels of oxides of nitrogen (NOx), as well as carbon monoxide and hydrocarbons. All dual bed converters, whether monolith or pellet type, contain both oxidation and three way catalysts.

A small diameter fuel tank filler tube is used on catalytic converter equipped vehicles to prevent the larger service station pump nozzle, used for leaded fuels, being inserted into the filler tube. Since the use of leaded fuels contaminates the catalyst, rendering them ineffective, the use of unleaded fuels is mandatory in catalytic converter equipped vehicles.



1 FUEL PUMP PRESSURE GAUGE

2 HOSE AND NIPPLE FROM PROPANE ENRICHMENT DEVICE (J-26911)

Catalytic Converter: Testing and Inspection

Fig. 32 Typical exhaust system restriction check. Models w/air injection

EXHAUST SYSTEM RESTRICTION CHECK

MODELS W/AIR INJECTION

1. Run engine until it reaches normal operating temperature, then stop engine.

2. Disconnect and remove check valve from air injection tube or manifold.

3. Connect suitable pressure gauge to nipple from propane enrichment tool J-26911 or equivalent, then insert nipple into injection tube opening, Fig. 32.

4. Start engine and run at 2500 RPM while observing gauge.

5. If gauge reading exceeds 2-3/4 psi, inspect entire exhaust system for collapsed pipes, heat distress or possible internal muffler failure.

6. If all other components are satisfactory, replace catalytic converter.

MODELS LESS AIR INJECTION

1. Run engine until it reaches normal operating temperature, then stop engine.

2. Connect suitable vacuum gauge to any convenient port to direct intake manifold vacuum.

3. Disconnect EGR solenoid electrical connector, if equipped, or reroute hoses as needed to connect EGR valve directly to vacuum source, bypassing any switches or solenoids.

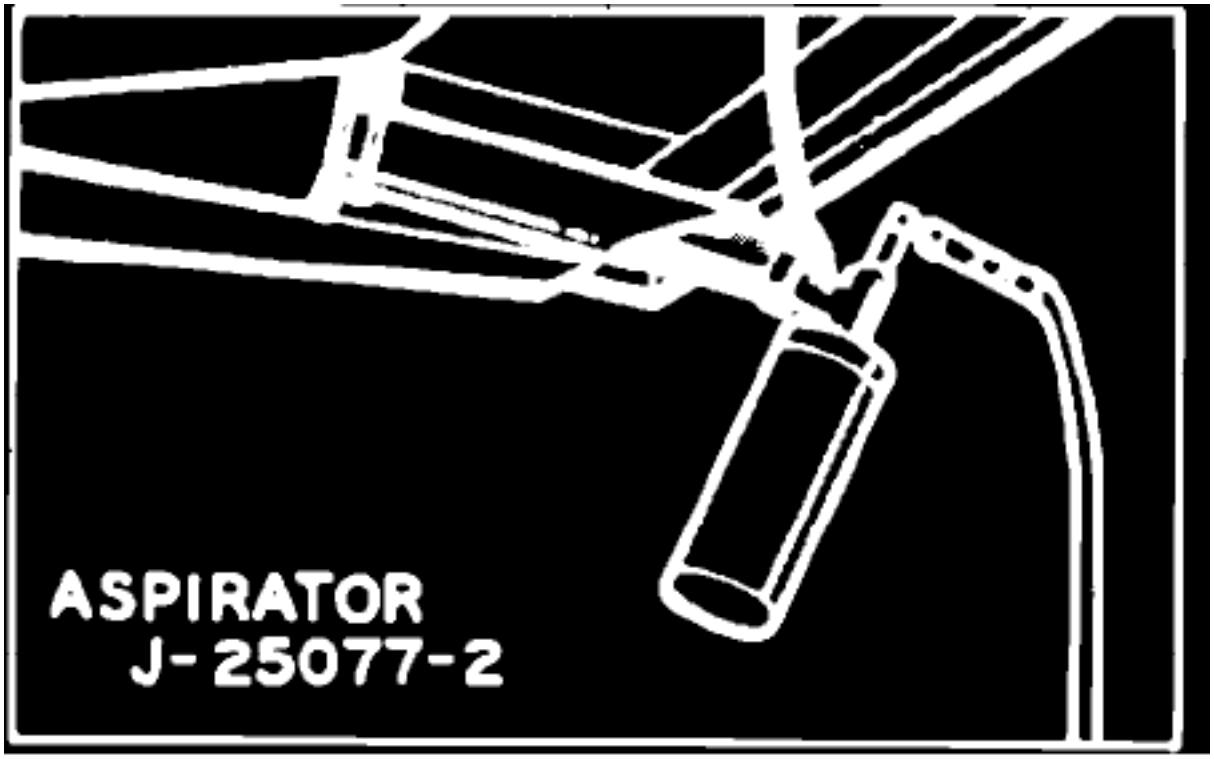
4. Run engine at 1000 RPM and record vacuum reading.

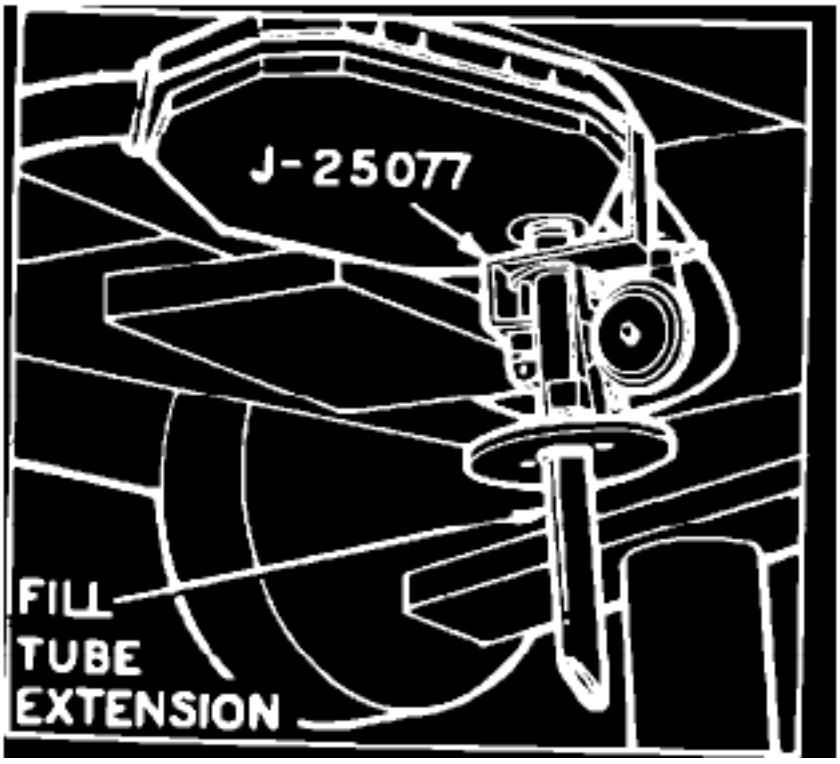
5. Slowly increase engine speed to 2500 RPM and record vacuum reading at a steady 2500 RPM.

6. If vacuum reading at 2500 RPM decreases more than 3 inches Hg from reading at 1000 RPM, check for exhaust restrictions as outlined for models with air injection.

7. If no restrictions are found, repeat check with exhaust pipe(s) disconnected from manifold(s).

8. If vacuum readings still differ by more than 3 inches Hg, check valve timing. On models without air injection or EGR, connect suitable vacuum gauge to intake manifold vacuum, and observe gauge with engine idling at normal operating temperature. If gauge reading regularly drops to zero, check exhaust system for restrictions and repair as needed.


ASPIRATOR
J-25077-2


J-25077
FILL
TUBE
EXTENSION

Catalytic Converter: Service and Repair

Fig. 33 Aspirator installation

Fig. 34 Vibrator installation

CATALYST REMOVAL Monolith type converters are not serviceable. The following procedure applies only to pellet type catalytic converters.

1. Raise and support vehicle.

2. Install aspirator, Fig. 33, and connect an air line to aspirator, creating a vacuum in the converter, thereby holding pellets in place when fill plug is removed.

3. If converter is equipped with threaded fill plug, use a 3/4 inch Allen wrench and remove fill plug from converter.

4. If converter is equipped with pressed fill plug, lightly drive a small chisel between converter shell and fill plug until fill plug distorts. Remove fill plug with pliers. Do not pry fill plug from converter, since damage to fill plug sealing surface may result.

5. Install vibrator and catalyst container, then adapter J-25077, if equipped with pressed fill plug, Fig. 34.

6. Disconnect air line from aspirator and connect to vibrator. Catalyst will now drain from converter.

7. When all catalyst has been drained from converter, remove container and discard the used catalyst.

CATALYST INSTALLATION

1. Fill container with recommended replacement catalyst and install fill tube extension to fixture.

2. Connect air line to aspirator and vibrator, then secure container to fixture.

3. When catalyst stops flowing, disconnect air line from vibrator making sure catalyst has filled converter flush with fill plug. Add catalyst, if necessary.

4. If equipped with threaded fill plug, apply suitable anti-seize compound to threads and install into converter. Torque fill plug to 50-60 ft. lbs.

5. If equipped with pressed fill plug, install service fill plug kit with dished fill plug facing outward.

6. Disconnect air supply from aspirator, then remove aspirator from converter.

Exhaust Manifold: Specifications

Exhaust Manifold Bolts 20 ft.lb

Exhaust Manifold: Service and Repair

SERIES 10---30/1500---3500 1980---85

1. Remove air cleaner and carburetor heat stove pipe.

2. Remove spark plugs and spark plug wiring heat shields.

3. Disconnect exhaust pipe from manifold, then remove manifold attaching bolts and the manifold.

4. Reverse procedure to install, using new gasket.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Relays and Modules - Powertrain Management > Relays and Modules - Computers and Control Systems > Electronic Spark Timing <--> [Electronic Spark Control Module] > Component Information > Locations > Typical Electronic Spark System (ESC)

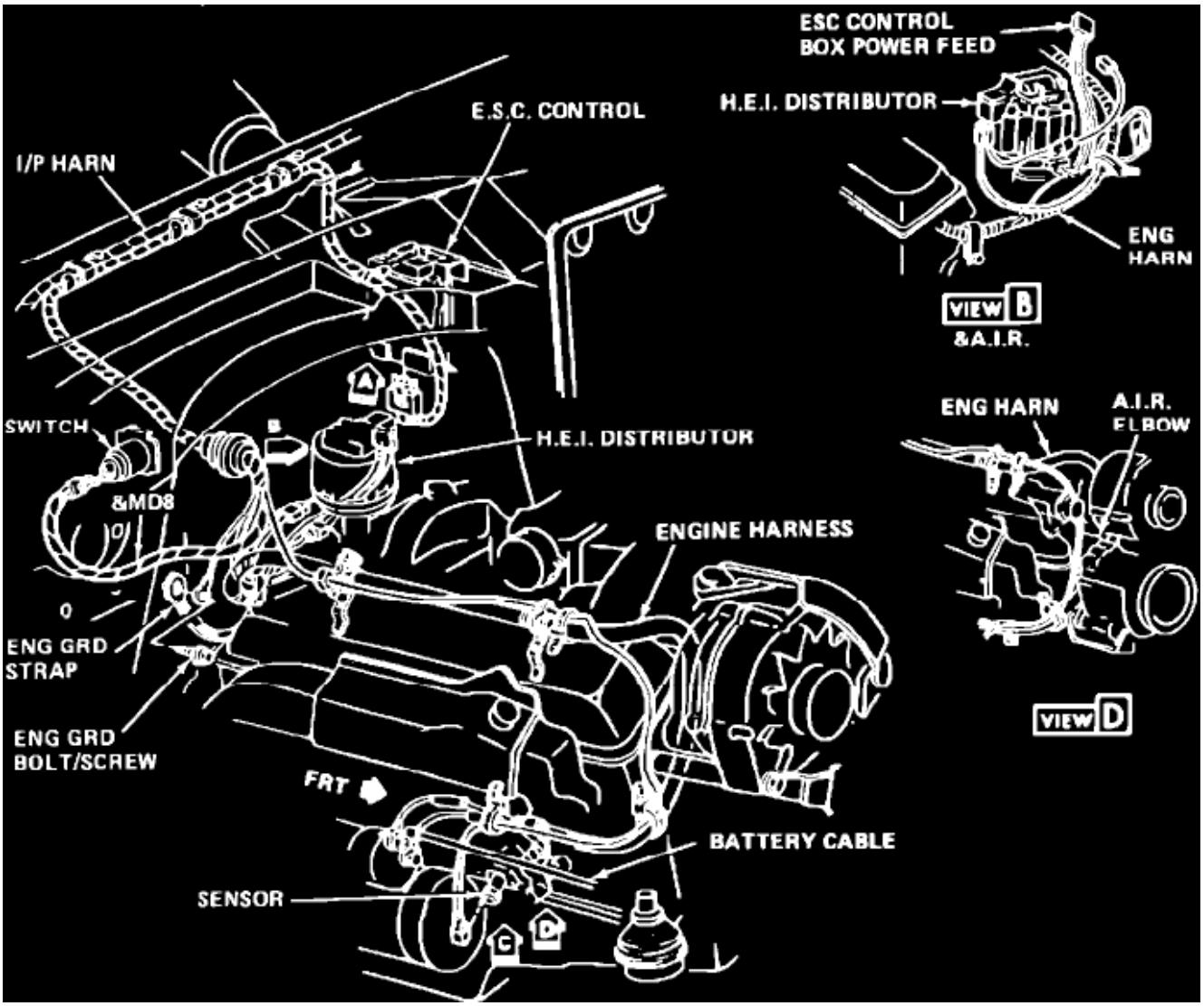


Fig. 46 Typical Electronic Spark System (ESC)

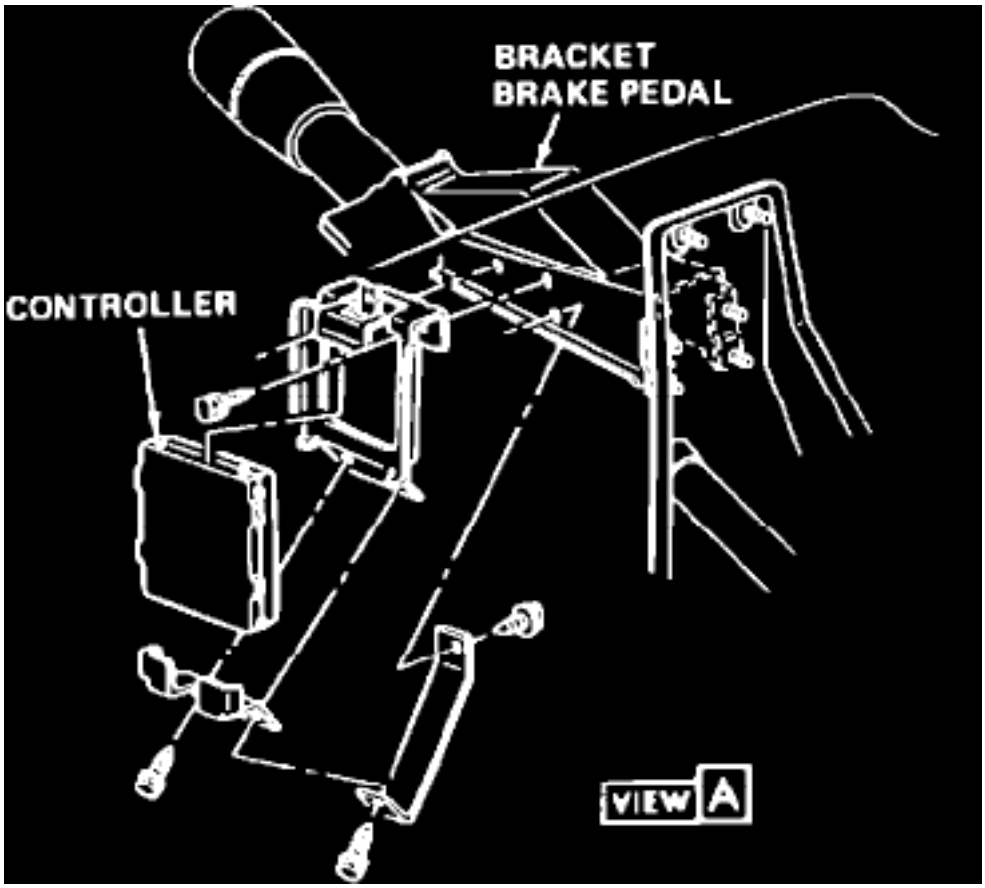
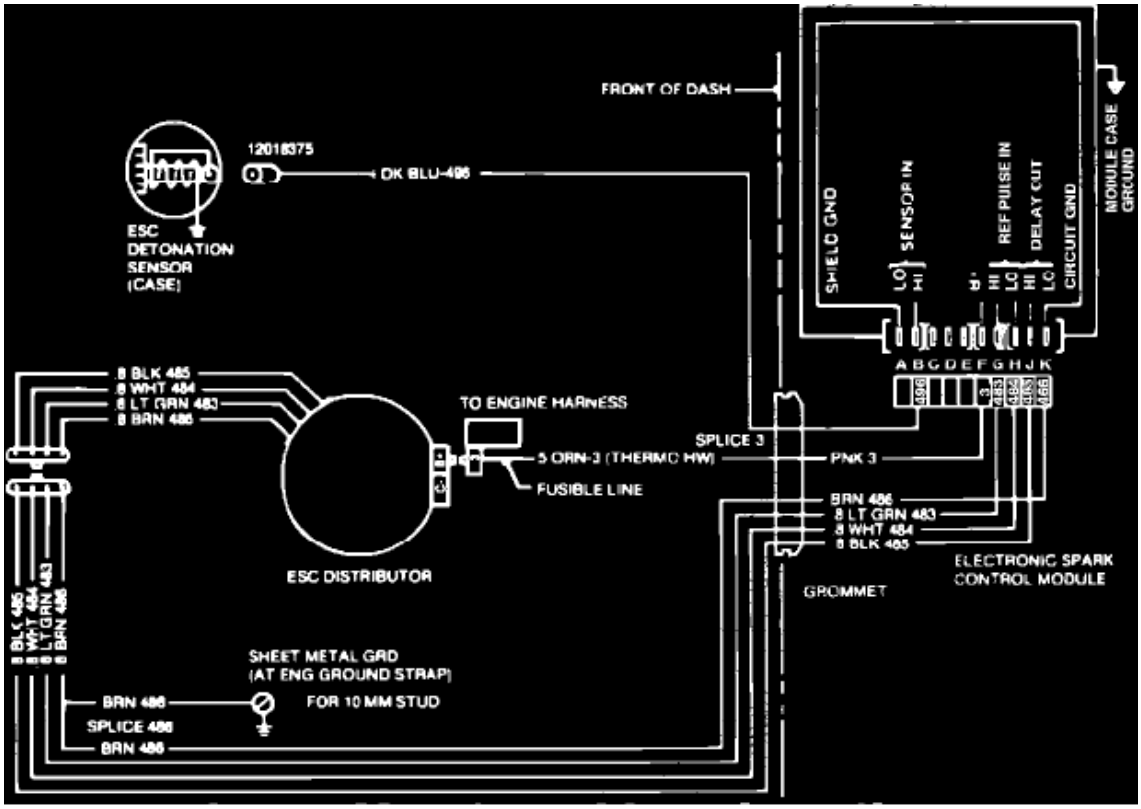
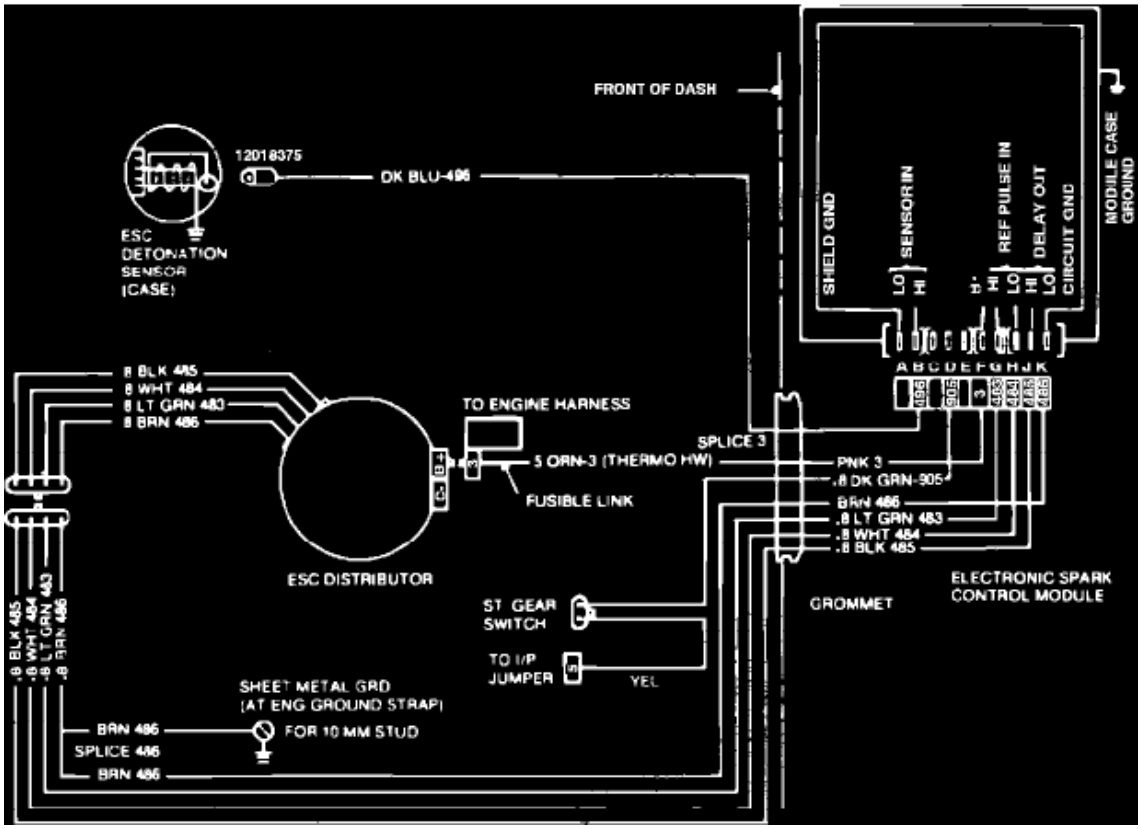


Fig. 47 Typical ESC Controller





Electronic Spark Timing: Testing and Inspection

Use the following procedures to diagnose ESC system malfunctions only. To diagnose general ignition system malfunctions, refer to ``High Energy Ignition (HEI) System Diagnosis.''

Fig. 5 ESC system wiring schematic. 1984-86 models w/manual 4 speed top loader transmission

Fig. 6 ESC system wiring schematic. 1984-86 models w/manual 3 & 4 speed side loader transmission

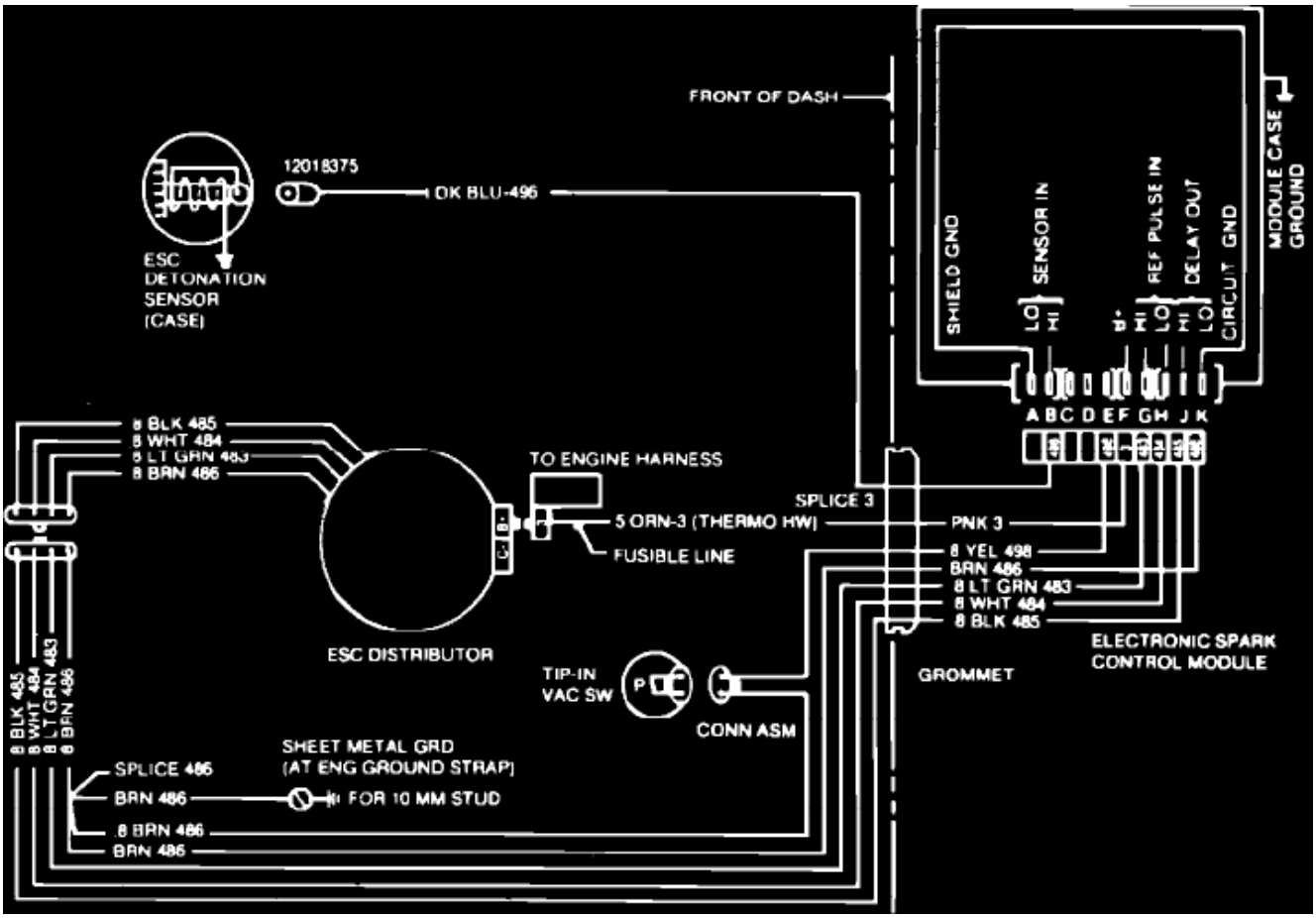


Fig. 7 ESC system wiring schematic. 1984-86 models w/auto. trans.

1984-86 MODELS

Engine Cranks But Will Not Start

1. Check for spark at at the ends of at least 2 spark plug wires using tester ST-125 or equivalent. If spark is observed, malfunction is not in ignition system.

2. If no spark is observed, disconnect 4 pin connector to distributor, connect jumper wire between pins A and C on distributor side of connector, Figs. 5, 6 and 7, and attempt to start engine. If engine starts, proceed to step 3. If engine does not start, proceed as follows:

a. Remove jumper wire and reconnect 4 pin connector to distributor. Turn on ignition and measure voltage at pins F and K of controller 10 pin

connector. If voltage is less than 11.6 volts, check feed circuit and repair as needed.

b. Set voltmeter on 2 volt scale and measure voltage between pins J and K of 10 pin connector while cranking engine. If reading is .75 volts or

greater, ESC system is satisfactory.

c. Set voltmeter on 2 volt scale and measure voltage between pins G and H of 10 pin connector while cranking engine. If reading is .20 volt or

greater, controller is defective. If reading is less than .20 volt, pole piece is defective.

3. Stop engine and remove jumper wire from distributor.

4. Connect suitable high resistance test lamp between distributor TACH terminal and ground, then turn on ignition. If test lamp lights, proceed to step 6.

5. If lamp does not light at TACH terminal, connect lamp between BAT terminal and ground and turn on ignition. If lamp does not light, repair feed circuit to ignition.

6. Crank engine with test lamp connected between distributor TACH terminal and ground. If test lamp flickers, system is satisfactory.

7. If test lamp does not flicker as engine is cranked, connect lamp between BAT terminal and pin A on distributor side of 4 pin ESC connector, then tap on coil. If coil makes a clicking noise when tapped, pole piece is defective.

8. If coil does not click, remove distributor cap an disconnect and reconnect pole piece electrical connector. If coil still does not click when tapped, ignition module is defective.

Poor Engine Performance

1. Disconnect distributor 4 pin connector, connect pins A and C on distributor side of connector with jumper wire, and road test vehicle.

2. If engine performance is still poor, cause is not in ESC system. If proper engine performance is restored by disconnecting ESC controller from distributor, remove jumper wire, reconnect 4 pin connector and proceed to next step.

3. Disconnect 10 pin connector from ESC controller, inspect terminals for proper contact, shots and opens, repair as needed, then recheck system operation.

4. If problem persists, disconnect 10 pin connector and measure resistance between pins B and K in connector. Reading should be 98-99 Kohms.

5. If resistance is not as specified, disconnect electrical connector from knock sensor and measure resistance between sensor terminal and ground. If resistance is 98-99 ohms, repair wiring between

knock sensor and controller. If resistance is not 98-99 Kohms, knock sensor is defective.

6. Reconnect 10 pin connector to controller and measure voltage between pins F and K with ignition on. If voltage reading is less than 11.6 volts repair feed circuit as needed.

7. Set voltmeter on 20 volt AC scale and measure voltage between connector pins H and K with ignition on. If reading is less than .20 volt, inspect system wiring and repair as needed. If reading is greater than .20 volt, ensure all connectors are properly seated, then road test vehicle. If problem persists, replace ESC controller.

Engine Detonation

1. Inspect connector and wiring to knock sensor and repair as needed.

2. Connect suitable spark advance tester to engine, run engine until it reaches normal operating temperature and set engine to run at a minimum of 1200 RPM, then observe ignition timing while tapping on exhaust manifold. If ignition timing retards when manifold is tapped, ESC system is operating properly.

3. Stop engine, disconnect 10 pin connector from ESC controller and measure resistance between pins B and K of connector. If resistance is not 98-99 ohms, proceed to step 5.

4. Measure resistance between pins H and K in connector. If resistance is 14-16 ohms, replace controller. If resistance is not 14-16 ohms, repair wiring to controller.

5. Disconnect electrical connector from knock sensor and measure voltage at sensor terminal with engine running at 2000 RPM. If reading is not .08 volt or more, knock sensor is defective.

6. Stop engine. If knock sensor voltage output is satisfactory, check wiring between knock sensor and terminal B of controller and between controller terminal K and ground and repair as needed.

Engine Control Module: Technical Service Bulletins Engine Controls - Aftermarket Accessory Usage

INFORMATION

Bulletin No.: 04-06-04-054B

Date: November 18, 2010

Subject: Info - Non-GM Parts and Accessories (Aftermarket)

Models:

2011 and Prior GM Passenger Cars and Trucks

Supercede: This bulletin is being revised to add model years and update to the new U.S. Fixed Operation Manager (FOM) and Canada Warranty Manager (WM) names. Please discard Corporate Bulletin Number 04-06-04-054A (Section 06 - Engine/Propulsion System).

The recent rise and expansion of companies selling non-GM parts and accessories has made it necessary to issue this reminder to dealers regarding GM's policy on the use and installation of these aftermarket components.

When a dealer is performing a repair under the New Vehicle Limited Warranty, they are required to use only genuine GM or GM-approved parts and accessories. This applies to all warranty repairs, special policy repairs or any repairs paid for by GM. Parts and accessories advertised as being "the same" as parts manufactured by GM, but not sold through GM, do not qualify for use in warranty repairs, special policy repairs or any repairs paid for by GM.

During a warranty repair, if a GM original equipment part is not available through GM Customer Care and Aftersales (GM CC&A;), ACDelco(R) distributors, other GM dealers or approved sources, the dealer is to obtain comparable, non-GM parts and clearly indicate, in detail, on the repair order the circumstances surrounding why non-GM parts were used. The dealer must give customers written notice, prior to the sale or service, that such parts or accessories are not marketed or warranted by General Motors.

It should also be noted that dealers modifying new vehicles and installing equipment, parts and accessories obtained from sources not authorized by GM are responsible for complying with the National Traffic and Motor Vehicle Safety Act. Certain non-approved parts or assemblies, installed by the dealer or its agent not authorized by GM, may result in a change to the vehicle's design characteristics and may affect the vehicle's ability to conform to federal law. Dealers must fully understand that non-GM approved parts may not have been validated, tested or certified for use. This puts the dealer at risk for potential liability in the event of a part or vehicle failure. If a GM part failure occurs as the result of the installation or use of a non-GM approved part, the warranty will not be honored.

A good example of non-authorized modification of vehicles is the result of an ever increasing supply of aftermarket devices available to the customer, which claim to increase the horsepower and torque of the Duramax(TM) Diesel Engines. These include the addition of, but are not limited to one or more of the following modifications:

- Propane injection

- Nitrous oxide injection

- Additional modules (black boxes) that connect to the vehicle wiring systems

- Revised engine calibrations downloaded for the engine control module

- Calibration modules which connect to the vehicle diagnostic connector

- Modification to the engine turbocharger waste gate

Although the installation of these devices, or modification of vehicle components, can increase engine horsepower and torque, they may also negatively affect the engine emissions, reliability and/or durability. In addition, other powertrain components, such as transmissions, universal joints, drive shafts, and front/rear axle components, can be stressed beyond design safety limits by the installation of these devices.

General Motors does not support or endorse the use of devices or modifications that, when installed, increase the engine horsepower and torque. It is because of these unknown stresses, and the potential to alter reliability, durability and emissions performance, that GM has adopted a policy that prevents any UNAUTHORIZED dealer warranty claim submissions to any remaining warranty coverage, to the powertrain and driveline components whenever the presence of a non-GM (aftermarket) calibration is confirmed - even if the non-GM control module calibration is subsequently removed. Refer to the latest version of Bulletin 09-06-04-026 (V8 Gas Engines) or 06-06-01-007 (Duramax(TM) Diesel Engines) for more information on dealer requirements for calibration verification.

These same policies apply as they relate to the use of non-GM accessories. Damage or failure from the use or installation of a non-GM accessory will not be covered under warranty. Failure resulting from the alteration or modification of the vehicle, including the cutting, welding or disconnecting of the vehicle's original equipment parts and components will void the warranty.

Additionally, dealers will NOT be reimbursed or compensated by GM in the event of any legal inquiry at either the local, state or federal level that

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

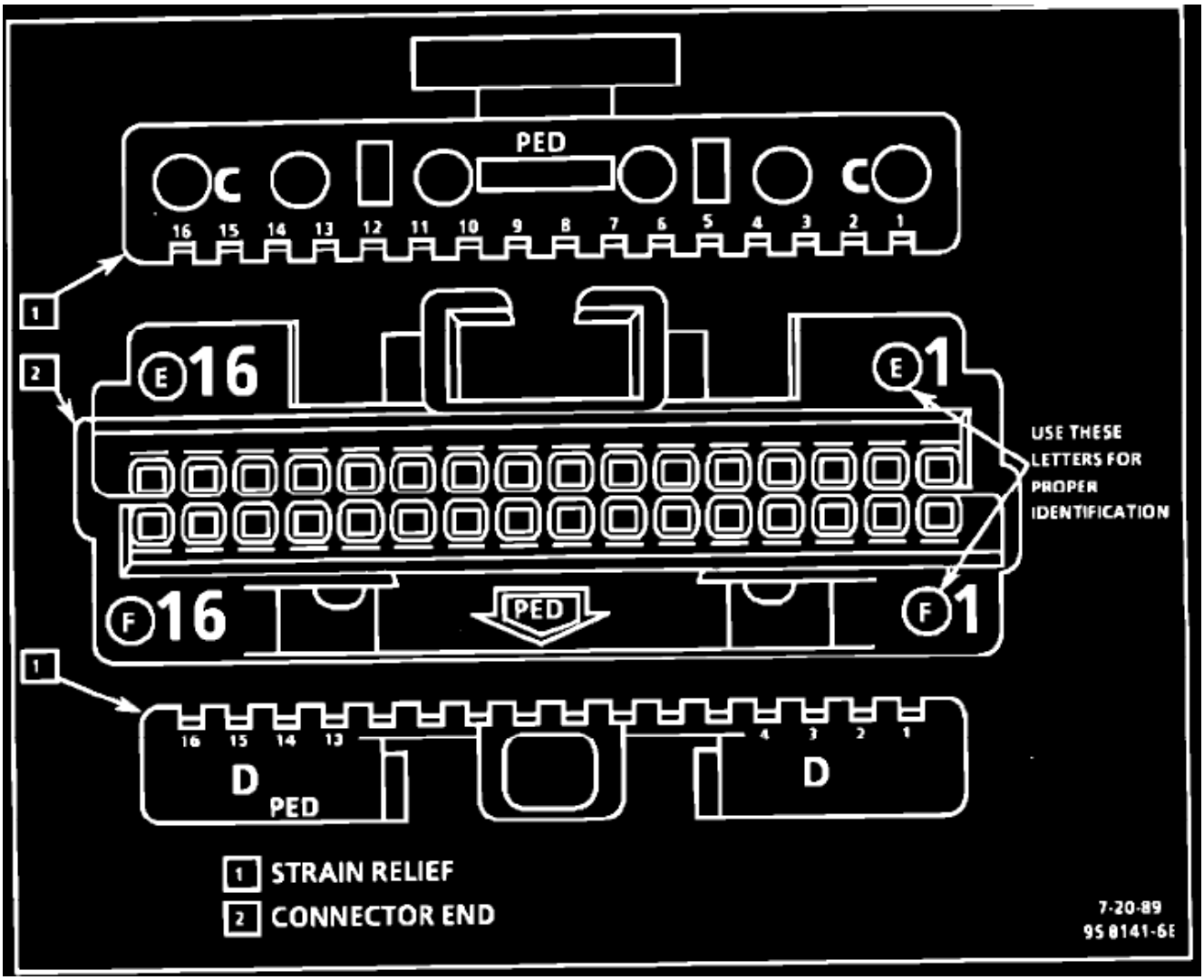
results from the alteration or modification of a vehicle using non-GM approved parts or accessories.

Dealers should be especially cautious of accessory companies that claim the installation of their product will not void the factory warranty. Many times these companies have even given direction on how to quickly disassemble the accessory in an attempt to preclude the manufacturer from finding out that is has been installed.

Any suspect repairs should be reviewed by the Fixed Operations Manager (FOM), and in Canada by the Warranty Manager (WM) for appropriate repair direction. If it is decided that a goodwill repair is to be made on the vehicle, even with the installation of such non-GM approved components, the customer is to be made aware of General Motors position on this issue and is to sign the appropriate goodwill documentation required by General Motors.

It is imperative for dealers to understand that by installing such devices, they are jeopardizing not only the warranty coverage, but also the performance and reliability of the customer's vehicle.

Disclaimer



Engine Control Module: Technical Service Bulletins ECM - Packard 32 Way Connector Identification

Number: 90-56-8

Section: 8

Date: September 1989

Corporate Bulletin No.: 916521R

Subject: PACKARD 32 WAY CONNECTOR IDENTIFICATION

Model and Year: 1980-90 A, B, F, G, J, L, W, Y CARS AND ALL TRUCKS WITH GMP4 ECM APPLICATIONS

TO: ALL CHEVROLET DEALERS

This bulletin serves to clarify the labeling of the Packard 32 way connectors used on the GMP4 under dash ECMS.

Currently a common strain relief is used in both the C-D 32 pin and the E-F 32 pin connectors. To properly identify these connectors, the strain reliefs must be removed. Use the lettering on the connector as shown on figure.

The colors used at this time for the 32 pin E-F connector are yellow, mint green or orange.

This updates any previous information released concerning identification that indicates any of these colors as being C & D connectors, found in the 6E and 8D Sections of the affected Service Manuals.

Engine Control Module: Technical Service Bulletins ECM/PCM - Damaged and/or Misdiagnosed

Number: 91-384-6E

Section: 6E

Date: AUGUST 1991

Corporate Bulletin No.: 176503

Subject: DAMAGED ECM/PCM AND/OR MIS-DIAGNOSED ECM/PCM SYMPTOMS DUE TO INCORRECT "TAP-TESTING" PROCEDURES

Model and Year: 1982-91 ALL PASSENGER CARS AND TRUCKS

CONDITION: Because of the intermittent nature of some Electronic Control Module (ECM) or Powertrain Control Modules (PCM) symptoms, some service technicians have been subjecting the ECM/PCM to vibration and/or shock testing. Commonly known as tap-testing, this procedure involves tapping on the ECM/PCM case, while the engine is running. It is generally accepted that if the engine or ECM/PCM falters due to the tapping, an intermittent internal ECM/PCM defect may be indicated. However, this may not always be true. If too much force is applied to the ECM/PCM during the test the following symptoms may result:

^ Immediate ECM/PCM failure.

^ ECM/PCM suffers damage which may cause a failure at a later date.

^ ECM/PCM Reset (or Glitch), creating a momentary stall, miss Service Engine Soon (SES) light and/or loss of serial data.

CAUSE: The ECM/PCM should be tapped using only the fingertips of one hand. Use of the palm, fist, or any type of tool subjects the ECM/PCM to forces that can cause both the circuit board and the outer aluminum case to flex and distort beyond design limits. The Integrated Circuits (IC) used in today's ECM/PCMs are mounted to the circuit board using a mounting process referred to as "surface technology." There are no circuit board holes for IC leads to go through. The IC leads set on pads, (28 pads or 52 pads depending on the IC) and solder is flowed around the leads to make the electrical connection to the circuit board.

^ Any flexing of the circuit board, beyond design limits, places the IC solder connections at risk of damage. Such damage may be apparent immediately, or it may appear at a future date. Circuit board deflection can occur as a result of striking the ECM/PCM, using ONLY THE PALM OF THE HAND.

^ If struck on the bottom side (the side opposite the service label), the ECM/PCM's aluminum outer case may deflect inward far enough to contact the electrical leads attached to the circuit board. Once in contact with the case the ECM/PCM electrical components will be shorted directly to ground. Although such shorting certainly has the potential to damage the ECM/PCM, it may not be permanent damage, depending on which circuit is involved. However, even if permanent damage is avoided, a short on any of the circuits will cause a disruption of normal ECM/PCM operation for the instant that the short occurs. This disruption may cause the ECM/PCM to reset (see "reset" above), creating the false impression that it is vibration sensitive or faulty. Reset is the ECM/PCM's normal way of coping with large voltage spikes. An ECM/PCM reset does not indicate that the ECM/PCM is defective or faulty, only that it is being subjected to abnormal conditions.

CORRECTION:

1. TAP THE ECM/PCM ONLY ON THE TOP SIDE (The top side is where the service label is located.)

^ This will minimize the chance of deflecting the ECM/PCM case into the electrical leads on the circuit board. The clearance between the case and the circuit board is closest on the bottom side of

the ECM/PCM.

2. TAP THE ECM/PCM USING ONLY THE FINGERTIPS - NO TOOLS.

^ To avoid excessive case deflection, avoid tapping in the center of the case. Tapping close to the edge of the ECM/PCM, especially in the corners, is best.

^ While using greater force may seem more effective, the test itself may cause the ECM/PCM to fail.

Engine Control Module: Technical Service Bulletins Engine Controls - ECM May Contain Wrong PROM

Number: 88-42

Section: 6E

Date: Sept., 1987

Subject: SERVICE REPLACEMENT ELECTRONIC MODULES (ECM) WITH PROM INSTALLED

Model and Year: 1981-88 ALL MODELS TO:

ALL CHEVROLET DEALERS

It has been brought to our attention that some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM for the vehicle.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

Engine Control Module: Technical Service Bulletins ECM - Revised Replacement Procedure

Number: 87-150

Section: 6E

Date: MAY, 1987

Subject: REVISED ECM REPLACEMENT PROCEDURE - CHART C-1

Model and Year: 1982 THROUGH 1987 ECM EQUIPPED VEHICLES

TO: ALL CHEVROLET DEALERS

The purpose of this bulletin is to introduce new ECM test procedures to reduce the possibility of multiple ECM failures on any one vehicle.

Since 1982, most ECM's have used an integrated circuit (IC) in place of separate transistors to turn "on" or "off" different components controlled by the ECM. These IC's are called quad drivers (QDR). Each QDR has four separate outputs, meaning it can turn "on" or "off" four different items independently.

A failed QDR usually results in an ECM output becoming either shorted to ground or open. Many times all four QDR output will be inoperative if just one vehicle circuit is faulty.

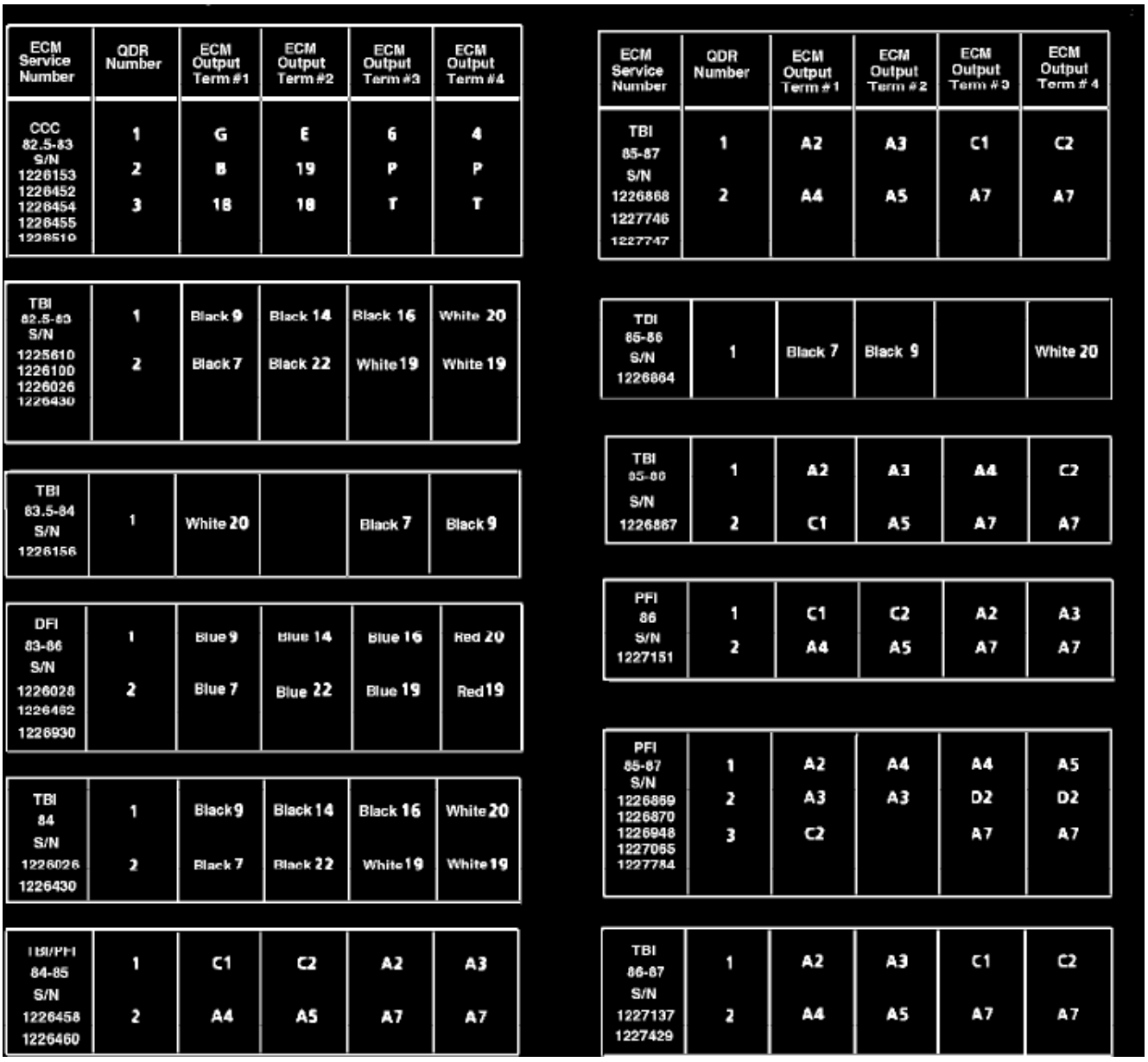
The revised diagnosis incorporates new test procedures designed to identify a damaged QDR. Once identified, the circuit must be repaired to reduce the incidence of repeat ECM failures.

This chart replaces the current service manual procedure for either:

1. Chart C-1 ECM replacement check, or

2. Any diagnostic chart where "replace ECM" is the conclusion, especially if a footnote indicates checking certain circuits for less than 20 OHM's resistance.

It is strongly suggested that this chart be used whenever an ECM replacement is indicated for 1982 through 1987 vehicles.



ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
CCC 82.5-83 S/N 1226153 1226452 1226454 1226455 1226510	1	G	E	6	4
	2	B	19	P	P
	3	18	18	T	T

ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
TBI 85-87 S/N 1226868 1227746 1227747	1	A2	A3	C1	C2
	2	A4	A5	A7	A7

TBI 82.5-83 S/N 1225610 1226100 1226026 1226430	1	Black 9	Black 14	Black 16	White 20
	2	Black 7	Black 22	White 19	White 19

TDI 85-86 S/N 1226864	1	Black 7	Black 9		White 20

TBI 83.5-84 S/N 1226156	1	White 20		Black 7	Black 9

TBI 85-86 S/N 1226867	1	A2	A3	A4	C2
	2	C1	A5	A7	A7

DFI 83-86 S/N 1226028 1226462 1226930	1	Blue 9	Blue 14	Blue 16	Red 20
	2	Blue 7	Blue 22	Blue 19	Red 19

PFI 86 S/N 1227151	1	C1	C2	A2	A3
	2	A4	A5	A7	A7

TBI 84 S/N 1226026 1226430	1	Black 9	Black 14	Black 16	White 20
	2	Black 7	Black 22	White 19	White 19

PFI 85-87 S/N 1226869 1226870 1226948 1227065 1227784	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	C2		A7	A7

TBI/PFI 84-85 S/N 1226458 1226460	1	C1	C2	A2	A3
	2	A4	A5	A7	A7

TBI 86-87 S/N 1227137 1227429	1	A2	A3	C1	C2
	2	A4	A5	A7	A7

QDR Application Chart

QDR Application Chart For CHART C-1

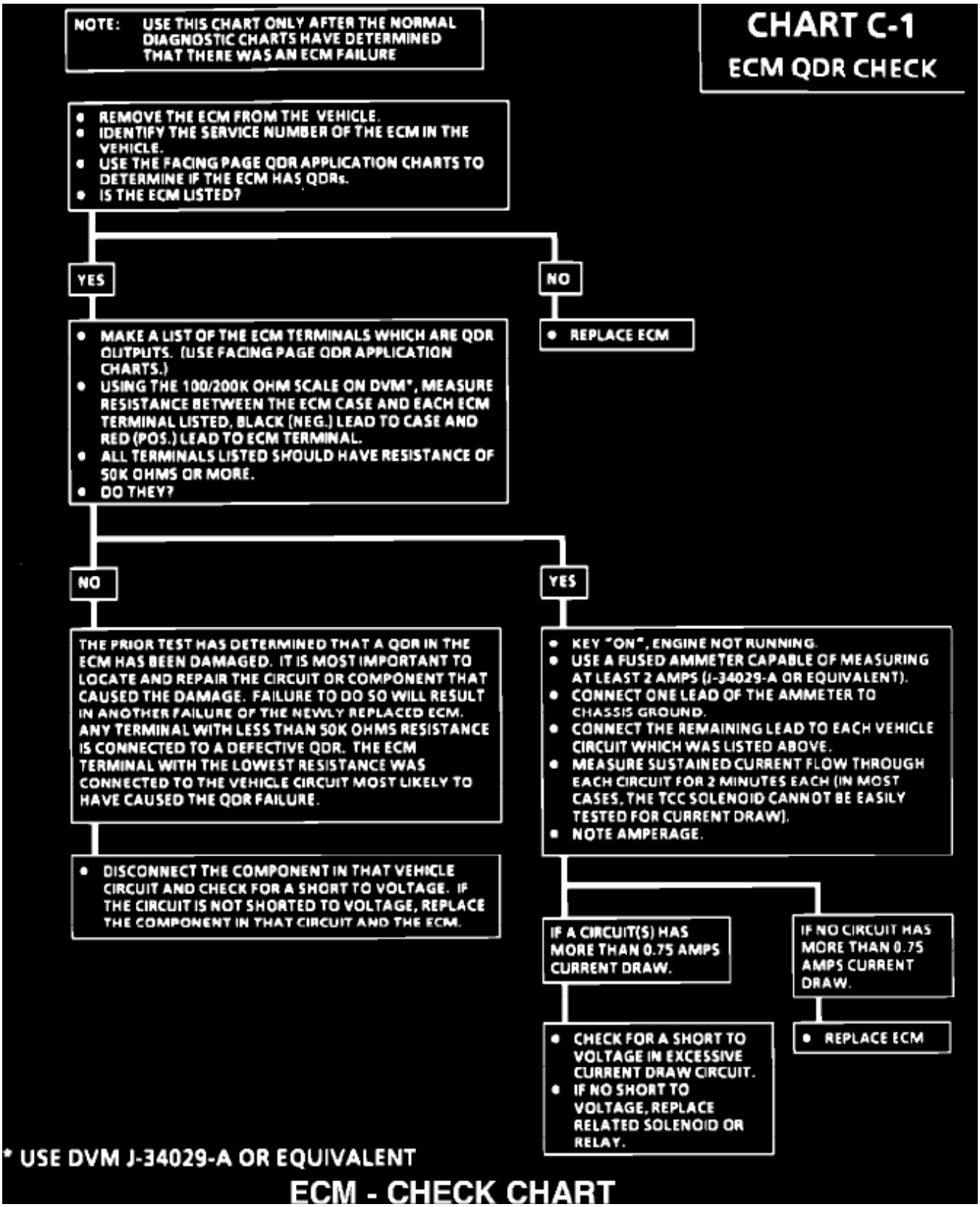
The following chart contains ECM QDR arrangement for all ECM models thru 1987.* Important Note:

^ Many 82-83 ECMs did not use QDRs, and will not appear on the chart.

^ This procedure will not work on any ECM Service Number which does not appear on the chart. (This is because such an ECM does not contain QDRs.)

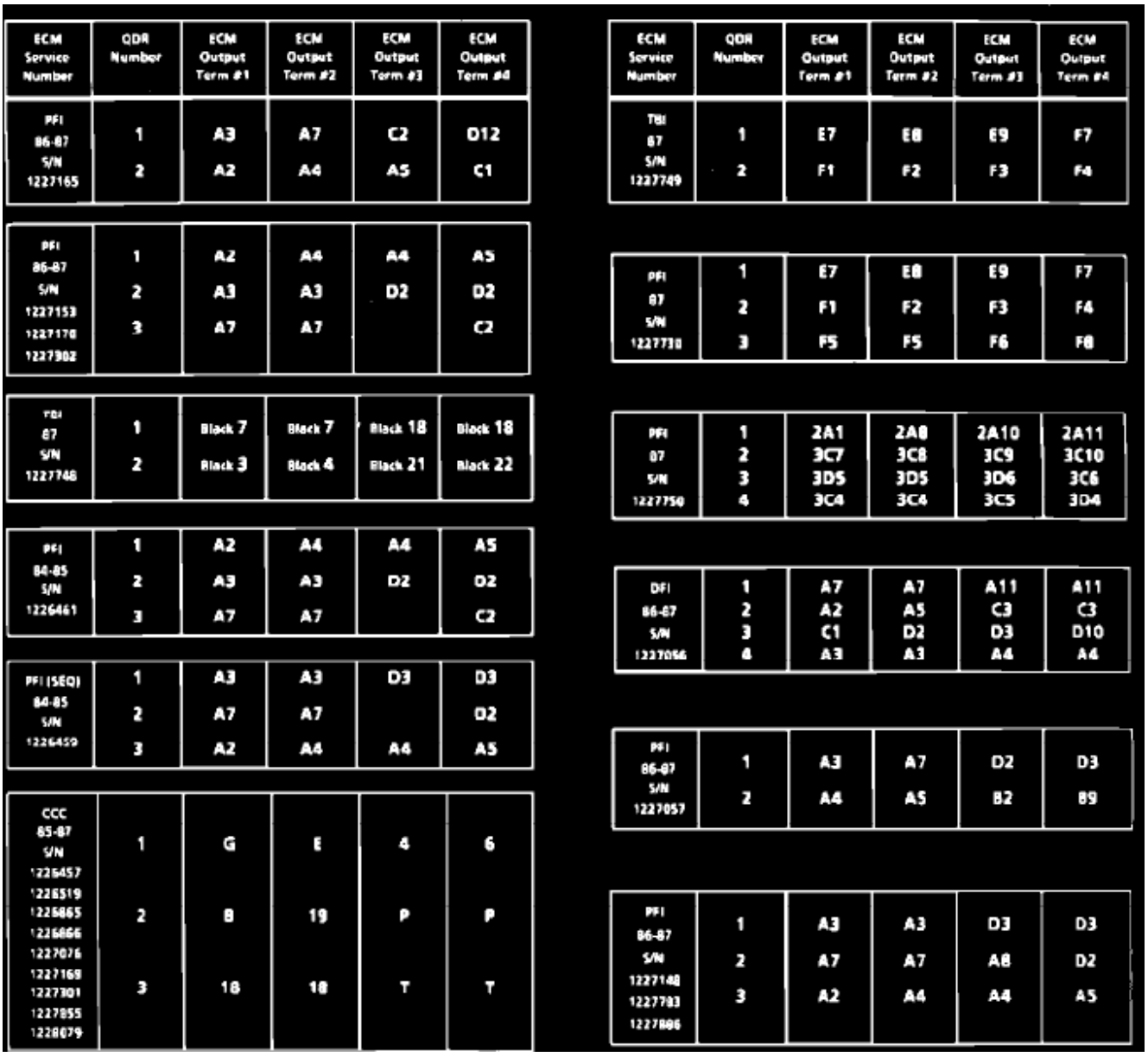
^ Not all available QDR outputs are used for ECM application. Verify circuit usage from the ECM wiring diagrams for each specific engine using Section "6E" of the service manual.

*Additional ECMs listed on page 4



ECM - CHECK CHART

ECM - CHECK CHART



ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
PFI 86-87 S/N 1227165	1	A3	A7	C2	D12
	2	A2	A4	A5	C1
PFI 86-87 S/N 1227153 1227170 1227902	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	A7	A7		C2
TBI 87 S/N 1227746	1	Black 7	Black 7	Black 18	Black 18
	2	Black 3	Black 4	Black 21	Black 22
PFI 84-85 S/N 1226461	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	A7	A7		C2
PFI (SEQ) 84-85 S/N 1226459	1	A3	A3	D3	D3
	2	A7	A7		D2
	3	A2	A4	A4	A5
CCC 85-87 S/N 1226457 1226519 1226865 1226866 1227076 1227169 1227301 1227855 1228079	1	G	E	4	6
	2	B	19	P	P
	3	18	18	T	T

ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
TBI 87 S/N 1227749	1	E7	E8	E9	F7
	2	F1	F2	F3	F4
PFI 87 S/N 1227738	1	E7	E8	E9	F7
	2	F1	F2	F3	F4
	3	F5	F5	F6	F8
PFI 87 S/N 1227750	1	2A1	2A8	2A10	2A11
	2	3C7	3C8	3C9	3C10
	3	3D5	3D5	3D6	3C6
	4	3C4	3C4	3C5	3D4
DFI 86-87 S/N 1227066	1	A7	A7	A11	A11
	2	A2	A5	C3	C3
	3	C1	D2	D3	D10
	4	A3	A3	A4	A4
PFI 86-87 S/N 1227057	1	A3	A7	D2	D3
	2	A4	A5	B2	B9
PFI 86-87 S/N 1227148 1227793 1227806	1	A3	A3	D3	D3
	2	A7	A7	A8	D2
	3	A2	A4	A4	A5

QDR APPLICATION CHART

QDR Application Chart For CHART C-1

The following chart contains ECM QDR arrangement for all ECM models thru 1987. Important Note:

^ Many 82-83 ECMs did not use QDRs, and will not appear on the chart.

^ This procedure will not work on any ECM Service Number which does not appear on the chart. (This is because such an ECM does not contain QDRs.)

^ Not all available QDR outputs are used for ECM application. Verify circuit usage from the ECM wiring diagrams for each specific engine using Section "6E" of the service manual.

ECM TERMINAL VOLTAGE

THIS ECM VOLTAGE CHART IS FOR USE WITH DIGITAL VOLTMETER TO FURTHER AID IN DIAGNOSIS. THESE VOLTAGES WERE DERIVED FROM A KNOWN GOOD VEHICLE. THE VOLTAGES YOU GET MAY VARY DUE TO LOW BATTERY CHARGE OR OTHER REASONS, BUT THEY SHOULD BE VERY CLOSE.

THE FOLLOWING CONDITIONS MUST BE MET BEFORE TESTING:

- ENGINE AT OPERATING TEMPERATURE
- CLOSED LOOP (ENGINE AT 1000 RPM)
- ENGINE AT 1000 RPM (FOR "ENGINE RUN" COLUMN)
- TEST TERMINAL NOT GROUNDED
- SCANNER NOT INSTALLED
- 2 WD

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open			
0	0	0	SENSOR RETURN	22	1
5	5	5	5V REFERENCE	21	2
.5-.65	2-3	*.5	VACUUM SENSOR SIGNAL	20	3
12	14	*.5	EGR	19	4
12	5-10 (var.)	*.5	M/C SOLENOID	18	5
			NOT USED	17	6
			NOT USED	16	7
			NOT USED	15	8
*.5	*.5	1.7	OXYGEN SENSOR – LO	14	9
*.5	*.5	*1.0	DIST. REF. PULSE – LO	13	10
*.5	1-2 (var.)	*.5	EST	12	11

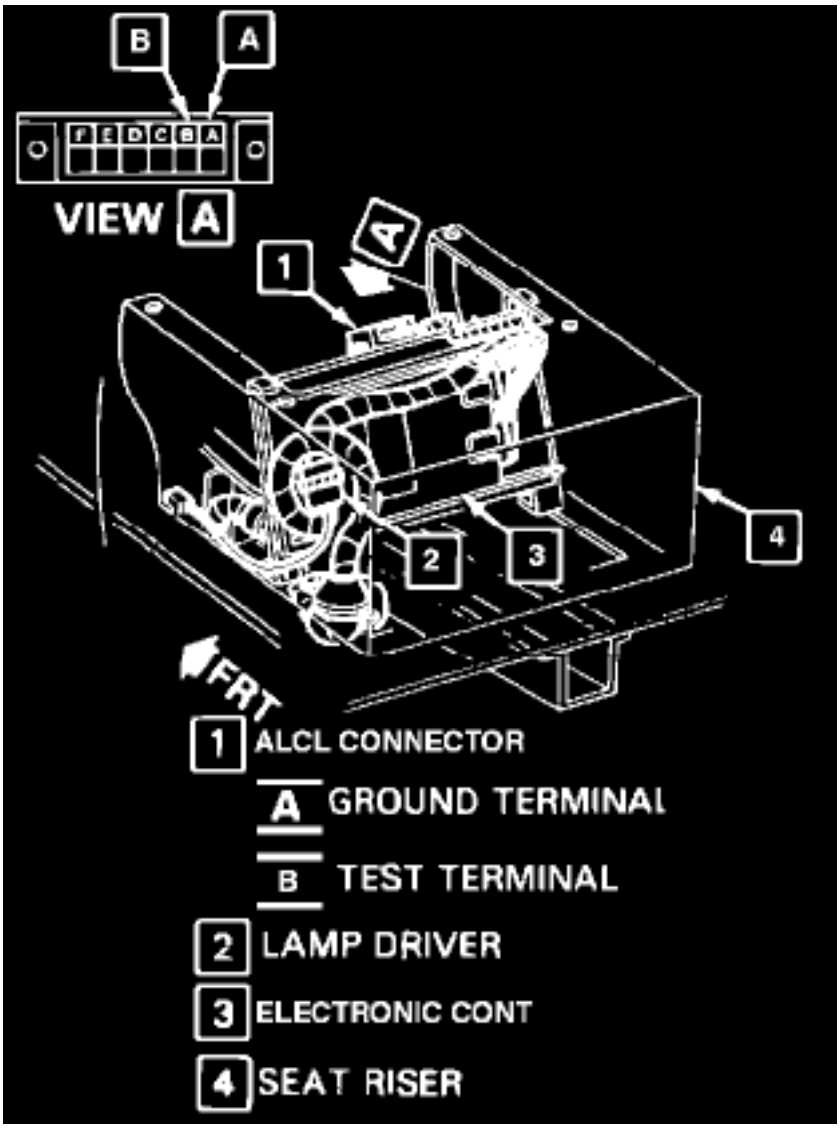
Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open	
NOT USED			
TPS SENSOR SIGNAL	*1.0 +5.0	*2.0	5.0
COOLANT TEMP. SENSOR SIGNAL	*3.0	*2.5	5.0
NOT USED			
DIAGNOSTIC TEST TERM	5	5	5
NOT USED			
COOLANT TEMP. SENSOR RETURN	0	0	0
NOT USED			
OXYGEN SENSOR – HI	.3-.45	.1-.9 (var.)	.3-.45
DIST. REF. PULSE – HI	*.5	1-2 (var.)	*.5
IGN. MODULE BY-PASS	*.5	3.7	*.5

			NOT USED	J	K
			NOT USED	H	L
10	*.5	*.5	"CHECK ENGINE" LAMP	G	M
			NOT USED	F	N
			NOT USED	E	P
			NOT USED	D	R
12	14	*.5	IGN. 1 POWER	C	S
12	.14	*.5	AIR DIVERT SOLENOID	B	T
0	0	0	GROUND (TO ENGINE)	A	U

NOT USED			
NOT USED			
NOT USED			
4TH GEAR SWITCH	*.5	*.5	12
TRANS CONVERTER CLUTCH SOLENOID	12	14	*.5
TROUBLE CODE MEMORY POWER	12	14	*.5
NOT USED			
PURGE	12	.12	*.5
GROUND (TO ENGINE)	0	0	0

* = Value Shown or Less Than that Value
† = Wide Open Throttle
(var.) = variable

ECM Terminal Identification & Voltage Specifications



Electronic Control Module

ECM TERMINAL VOLTAGE

THIS ECM VOLTAGE CHART IS FOR USE WITH DIGITAL VOLTMETER TO FURTHER AID IN DIAGNOSIS. THESE VOLTAGES WERE DERIVED FROM A KNOWN GOOD VEHICLE. THE VOLTAGES YOU GET MAY VARY DUE TO LOW BATTERY CHARGE OR OTHER REASONS, BUT THEY SHOULD BE VERY CLOSE.

THE FOLLOWING CONDITIONS MUST BE MET BEFORE TESTING:

- ENGINE AT OPERATING TEMPERATURE
- CLOSED LOOP (ENGINE AT 1000 RPM)
- ENGINE AT 1000 RPM (FOR "ENGINE RUN" COLUMN)
- TEST TERMINAL NOT GROUNDED
- SCANNER NOT INSTALLED
- 2 WD

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open			
0	0	0	SENSOR RETURN	22	1
5	5	5	5V REFERENCE	21	2
.5-.65	2-3	*.5	VACUUM SENSOR SIGNAL	20	3
12	14	*.5	EGR	19	4
12	5-10 (var.)	*.5	M/C SOLENOID	18	5
			NOT USED	17	6
			NOT USED	16	7
			NOT USED	15	8
*.5	*.5	1.7	OXYGEN SENSOR – LO	14	9
*.5	*.5	*1.0	DIST. REF. PULSE – LO	13	10
*.5	1-2 (var.)	*.5	EST	12	11

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open	
NOT USED			
TPS SENSOR SIGNAL	*1.0 +5.0	*2.0	5.0
COOLANT TEMP. SENSOR SIGNAL	*3.0	*2.5	5.0
NOT USED			
DIAGNOSTIC TEST TERM	5	5	5
NOT USED			
COOLANT TEMP. SENSOR RETURN	0	0	0
NOT USED			
OXYGEN SENSOR – HI	.3-.45	.1-.9 (var.)	.3-.45
DIST. REF. PULSE – HI	*.5	1-2 (var.)	*.5
IGN. MODULE BY-PASS	*.5	3.7	*.5

			NOT USED	J	K
			NOT USED	H	L
10	*.5	*.5	"CHECK ENGINE" LAMP	G	M
			NOT USED	F	N
			NOT USED	E	P
			NOT USED	D	R
12	14	*.5	IGN. 1 POWER	C	S
12	.14	*.5	AIR DIVERT SOLENOID	B	T
0	0	0	GROUND (TO ENGINE)	A	U

NOT USED			
NOT USED			
NOT USED			
4TH GEAR SWITCH	*.5	*.5	12
TRANS CONVERTER CLUTCH SOLENOID	12	14	*.5
TROUBLE CODE MEMORY POWER	12	14	*.5
NOT USED			
PURGE	12	.12	*.5
GROUND (TO ENGINE)	0	0	0

* = Value Shown or Less Than that Value
† = Wide Open Throttle
(var.) = variable

ECM Terminal Identification & Voltage Specifications

Engine Control Module: Description and Operation "E" Cell

The ``E'' cell controls voltage at ECM terminal 15. For the first 25,000 miles of vehicle operation, voltage is nearly zero. The ``E'' cell then causes voltage to rise to approximately 5 volts. This provides a different control value for some systems.

Engine Control Module: Description and Operation Electronic Spark Timing (EST)

Electronic Spark Timing is used on all Calif. vehicles. The EST distributor contains no centrifugal or vacuum advance and uses a seven terminal High Energy Ignition (HEI) module. A four-terminal connector is used for EST use, in addition to the connectors normally found on HEI distributors. All spark timing changes are controlled by the ECM, which monitors information from the various engine sensors, computes the correct spark timing, then signals the distributor to adjust the timing accordingly. The distributor operates without ECM control during cranking or when setting basic ignition timing. This is known as the ``Bypass'' mode and it is determined by the bypass lead from the ECM to the distributor. When the bypass lead voltage is 5 volts, the ECM performs the spark timing function. However, when the bypass lead is grounded or open circuited, the HEI module assumes the spark control function. Disconnecting the four-terminal EST connector causes the engine to automatically operate in the bypass mode. The EST connector should be disconnected whenever setting basic ignition timing.

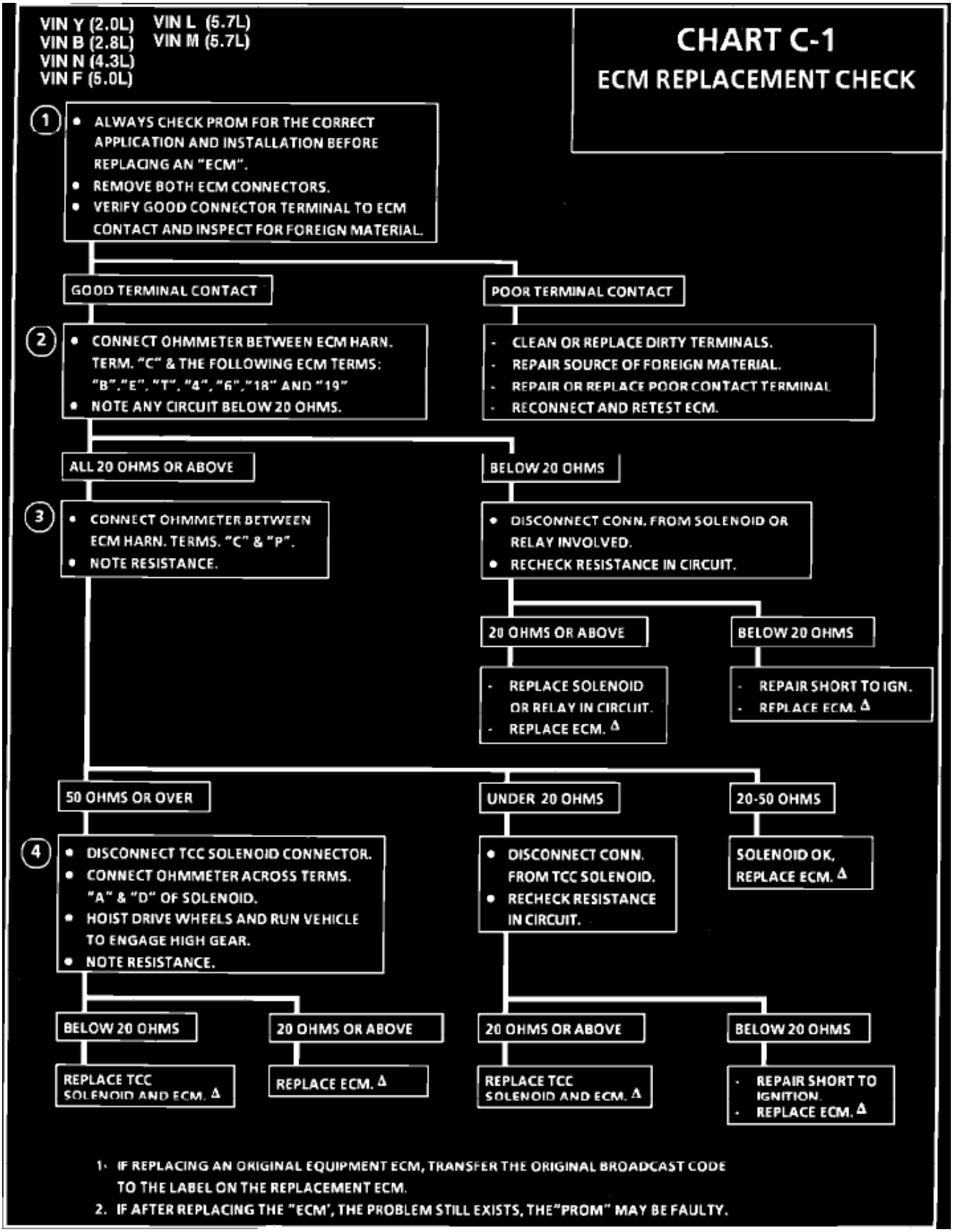
The ECM is the control center of the C3 system. Its function is to monitor input information from the various sensors, process this information, then generate output commands to the various systems that affect the performance of the vehicle. The ability of the ECM to perform these functions is dependent upon a removable calibration unit called the PROM. There are specific ECM/PROM combinations for each vehicle and they should not be interchanged. The ECM also performs the diagnostic function of the C3 system, alerting the driver through a ``Check Engine'' light should any problem in the system arise and storing a code or series of codes which the technician uses as an aid in making repairs.

Engine Control Module: Description and Operation Trouble Code Memory

The ECM is capable of sensing certain system malfunctions, storing data related to these malfunctions in the trouble code memory and alerting the operator of the malfunctions through the instrument panel mounted "Check Engine" lamp. If a system malfunction occurs while the engine is running, the ``Check Engine'' lamp will light and a trouble code will be stored in the ECM memory. The lamp will remain on with the engine running until malfunction is corrected. If the malfunction is intermittent, the lamp will go out but the code will remain stored in the trouble code memory.

Engine Control Module: Diagnostic Trouble Code Descriptions

For information regarding B, C, P, U and Manufacturer Code Descriptions -

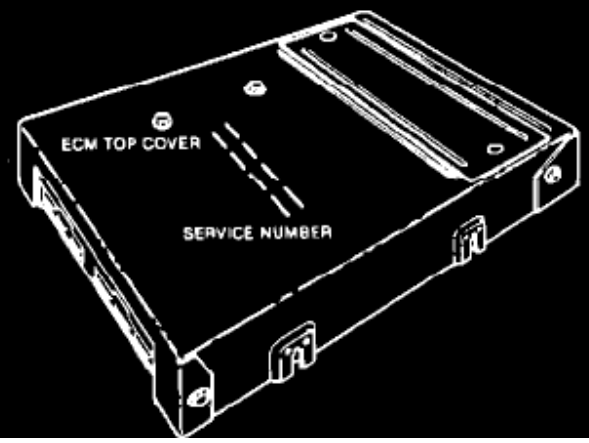


Engine Control Module: Component Tests and General Diagnostics

Chart C-1 - ECM Replacement Check

Remove or Disconnect (Figures 1 and 2)

1. New electronic control module out of its packaging and check the service number to make sure it is the same as the faulty ECM.
2. Access cover so that PROM from faulty ECM may be installed in replacement ECM.



Important

REPLACEMENT ELECTRONIC CONTROL MODULE (ECM) IS SUPPLIED WITHOUT AN ENGINE CALIBRATION UNIT (PROM) SO CARE SHOULD BE TAKEN WHEN REMOVING THE PROM FROM THE DEFECTIVE ECM AS IT WILL BE REUSED IN THE NEW ECM. REFER TO PROM REPLACEMENT PROCEDURE AS DETAILED IN CODE 51.

ECM Replacement Check for Chart C-1

CHART C-1 - ECM REPLACEMENT CHECK

Circuit Description: Prior to replacing an ECM, the circuit involved must be tested for:

^ Poor connector terminal to ECM contact;

^ Direct battery voltage on an ECM ground circuit from a short to B+; or

^ Shorted solenoid or relay. If a short is found, the circuit must be repaired prior to replacing the ECM to prevent repeat ECM failures

Test Description:

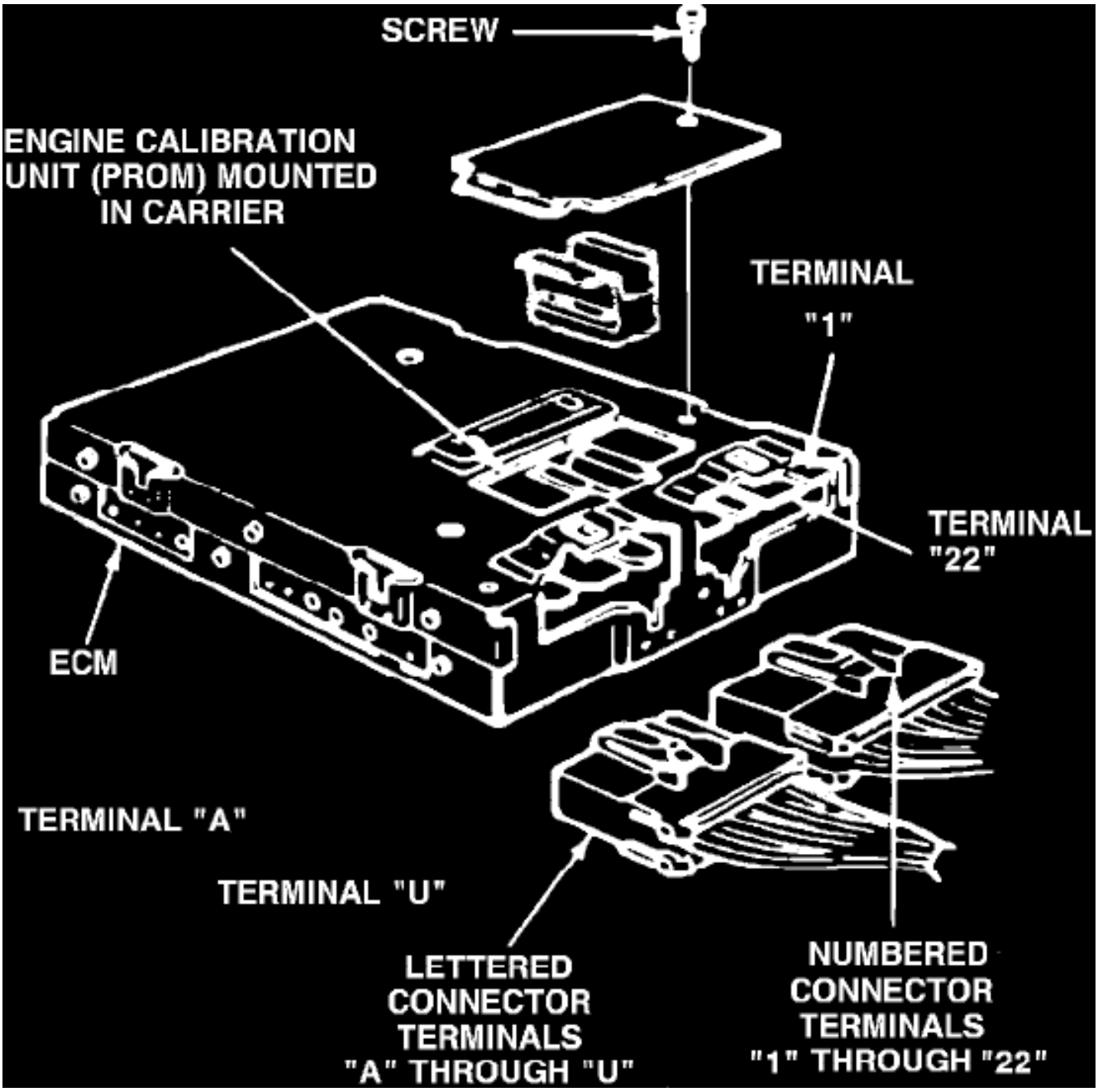
1. Check for good terminal contact due to weak or dirty terminals. Remove terminal to inspect. Replace if broken or dirty. If coolant is present, replace coolant sensor and connector. Also, replace ECM connector terminal and blow coolant out of harness. Clean connector with alcohol or spray contact cleaner and replace ECM.

2. Check for a short to ignition or shorted solenoid or relay. All terminals must be tested since several are connected internally in the ECM. A short in one circuit may cause another circuit in the ECM to be inoperative that does not have an external fault, but was the cause of "driver's complaint." Any circuit testing below 20 ohms is shorted to ignition, or shorted across the relay or solenoid.

3. Check for shorted TCC solenoid. Some transmissions have a normally open 4th gear switch in series with the solenoid. The ohmmeter will read infinite resistance (open circuit) in these cases. If the reading is less than 20 ohms, a short to ignition or faulty solenoid exists. A normal solenoid will

read between 20 - 50 ohms.

4. Check for shorted TCC circuit in units with a 4th gear switch. The vehicle must be in 4th gear to close the switch to obtain a resistance reading. A normal solenoid will read between 20-50 ohms.



Engine Control Module: Service and Repair

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB #88-42, DATED 09/87

Some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB #88-283-6E, DATED 7/88

To prevent possible electrostatic discharge damage to electrical components:

-Do not touch the ECM connector pins or soldered components on the circuit board. -When handling a PROM, CAL-PAK or MEM-CAL, do not touch the component leads and do not remove integrated circuit from carrier.

Fig. 249 Electronic Control Module (ECM)

1. Disconnect battery ground cable.

2. Disconnect numbered and lettered connectors from ECM, Fig. 249.

3. Remove ECM mounting hardware, then the ECM from the passenger compartment.

4. Reverse procedure to install. Replacement Electronic Control Modules are not equipped with engine calibration units (PROM). If PROM is to be reused, care should be taken when removing it from defective ECM. See ``Prom, Replace'' for proper removal procedure.

Engine	Year	Resistance (ohms)
All TBI	1981-90	20 min.

Idle Speed Control Motor: Electrical Specifications

IDLE SPEED CONTROL

Measured between terminals A& B and C & D.

Idle Speed Control Motor: Mechanical Specifications

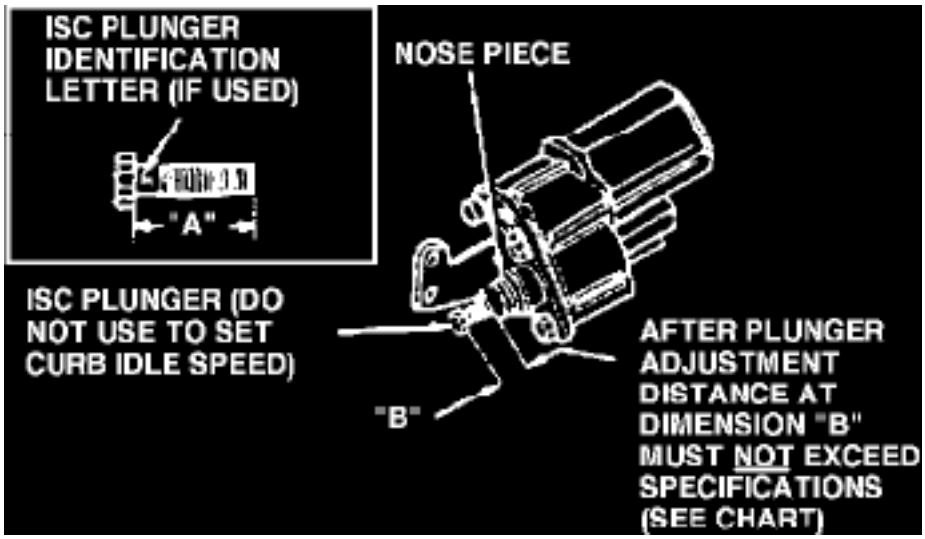
ISC PLUNGER ADJUSTMENT CHART

Identification Letter	Plunger Length Dimension "A"	Plunger Length Dimension "B"
None	14.1 mm (9/16")	5.6 mm (7/32")
None	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/6'4")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1LL)	17.1 mm (43/64")
L	27.5 mm (1 -3/32")	19.0 mm (3/4")
J	30.0 mm (1-3/16")	21.5 mm (27/32")
N	32.0 mm (1-17/64")	23.5 mm (59/64")
T	34.0 mm (1-11/32")	25.5 mm (1")

Idle Speed Control Motor: Description and Operation

The ISC assembly controls engine idle speed according to ECM programming.

When the throttle lever rests against the ISC plunger, the ISC acts as a dashpot on throttle closing per second.



Idle Speed Control Motor: Adjustments

On engines equipped with an idle speed control motor, idle speed is controlled by an electrical signal from the ECM. Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows. See Underhood Emission Label.

Plunger - Maximum Adjustment

NOTE: Prior to adjustment, check for an identification letter on the ISC plunger. If NO LETTER appears, using Tool J-29607, BT-8022 or equivalent,

remove plunger from ISC Unit. Then, measure length of plunger from back side of plunger head to end of plunger screw - Dimension "A". Record this measurement for use at Step 17. Reinstall plunger in ISC unit, turning plunger into a preset position so that the distance measured from the back side of the plunger head to the ISC nosepiece is LESS THAN Dimension "B".

ISC PLUNGER ADJUSTMENT CHART

Identification Plunger Length Plunger Length

Letter Dimension "A" Dimension "B"

None 14.1 mm (9/16") 5.6 mm (7/32")

None 16.3 mm (41/64") 8.0 mm (5/16")

X 18.5 mm (47/64") 10.0 mm (25/6'4")

A 19.3 mm (49/64") 10.8 mm (27/64")

Y 20.5 mm (51/64") 12.0 mm (15/32")

S 21.2 mm (27/32") 12.7 mm (1/2")

Z 22.5 mm (7/8") 14.0 mm (35/64")

G 23.2 mm (29/32") 14.7 mm (37/64")

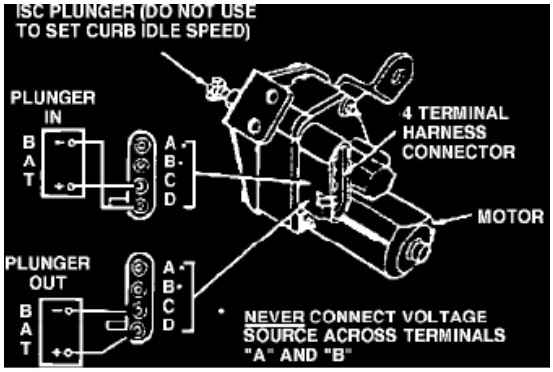
E 25.6 mm (1LL) 17.1 mm (43/64")

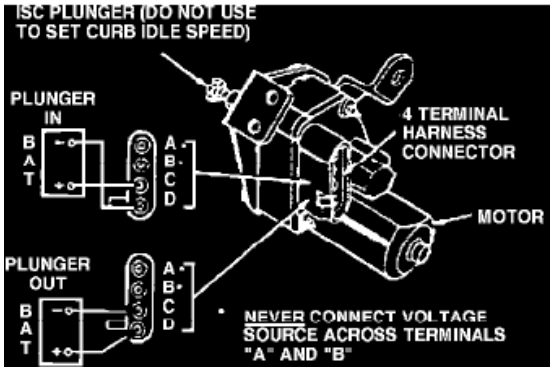
L 27.5 mm (1 -3/32") 19.0 mm (3/4")

J 30.0 mm (1-3/16") 21.5 mm (27/32")

N 32.0 mm (1-17/64") 23.5 mm (59/64")

T 34.0 mm (1-11/32") 25.5 mm (1")





Idle Speed Control Assembly - Typical

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures - see emission label for latest instructions.

2. Before starting engine, place transmission in PARK (AUTO trans.) or NEUTRAL (MANUAL transmission), set parking brake, and block drive wheels.

3. Connect dwell meter to mixture control (M/C) solenoid dwell lead. Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF".

5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary).

6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

7. Unplug connector from ISC motor.

8. Fully retract ISC plunger by applying 12 volts to terminal "C" and grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

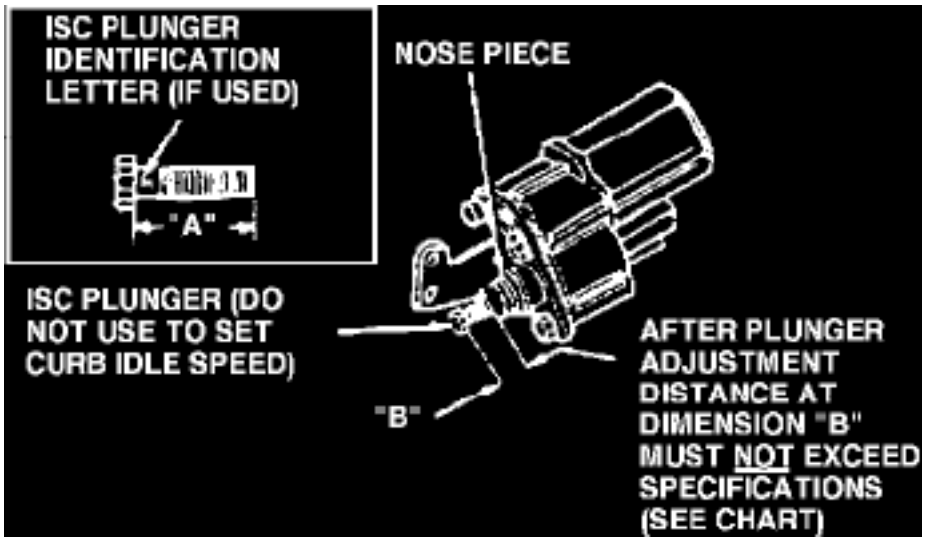
9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place A.T. transmission in Drive.

11. With ISC plunger fully retracted, adjust carburetor base (slow) idle stop screw (minimum authority) to the RPM shown in the carburetor charts.

12. PLACE TRANSMISSION IN PARK (AUTO TRANS.) OR NEUTRAL (MANUAL TRANS.).

Idle Speed Control Assembly - Typical



13. Fully extend ISC Plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC Motor Connection. Leave power

applied only long enough to extend the plunger.

14. Manual transmission: Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown

in carburetor charts.

15. Automatic Transmission:

a. With transmission in PARK, using Tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

b. With parking brake set and drive wheels blocked, place transmission in drive. Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown in carburetor charts.

Plunger - Maximum Adjustment

16. Recheck ISC "Maximum Authority" RPM with voltage applied to Motor (Step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nose piece, Dimension "B". Dimension must NOT exceed

that shown by plunger type as either identified by plunger length or letter identification.

18. Fully retract ISC Plunger (Step 8). Place transmission in PARK (AUTO Trans.) or NEUTRAL (MANUAL Transmission) and turn ignition "Off".

Disconnect 12 Volt Power source, Ground lead, Tachometer and Dwell Meter. With ignition "Off" reconnect four Terminal Harness connectors to ISC Motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By restoring

the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Engine	Year	Resistance (ohms)
All TBI	1981-90	20 min.

Idle Speed Control Motor: Electrical Specifications

IDLE SPEED CONTROL

Measured between terminals A& B and C & D.

Idle Speed Control Motor: Mechanical Specifications

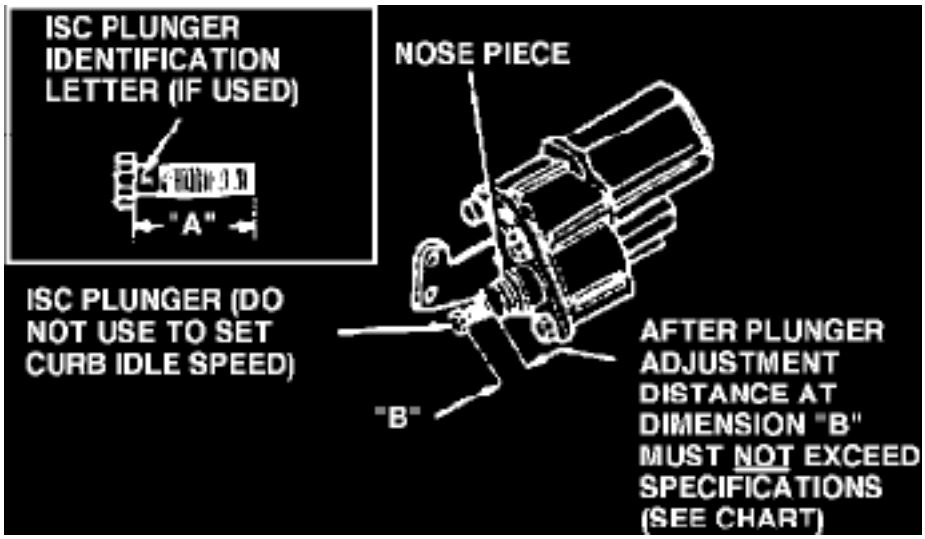
ISC PLUNGER ADJUSTMENT CHART

Identification Letter	Plunger Length Dimension "A"	Plunger Length Dimension "B"
None	14.1 mm (9/16")	5.6 mm (7/32")
None	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/6'4")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1LL)	17.1 mm (43/64")
L	27.5 mm (1 -3/32")	19.0 mm (3/4")
J	30.0 mm (1-3/16")	21.5 mm (27/32")
N	32.0 mm (1-17/64")	23.5 mm (59/64")
T	34.0 mm (1-11/32")	25.5 mm (1")

Idle Speed Control Motor: Description and Operation

The ISC assembly controls engine idle speed according to ECM programming.

When the throttle lever rests against the ISC plunger, the ISC acts as a dashpot on throttle closing per second.



Idle Speed Control Motor: Adjustments

On engines equipped with an idle speed control motor, idle speed is controlled by an electrical signal from the ECM. Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows. See Underhood Emission Label.

Plunger - Maximum Adjustment

NOTE: Prior to adjustment, check for an identification letter on the ISC plunger. If NO LETTER appears, using Tool J-29607, BT-8022 or equivalent,

remove plunger from ISC Unit. Then, measure length of plunger from back side of plunger head to end of plunger screw - Dimension "A". Record this measurement for use at Step 17. Reinstall plunger in ISC unit, turning plunger into a preset position so that the distance measured from the back side of the plunger head to the ISC nosepiece is LESS THAN Dimension "B".

ISC PLUNGER ADJUSTMENT CHART

Identification Plunger Length Plunger Length

Letter Dimension "A" Dimension "B"

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S 21.2 mm (27/32") 12.7 mm (1/2")

Z 22.5 mm (7/8") 14.0 mm (35/64")

G 23.2 mm (29/32") 14.7 mm (37/64")

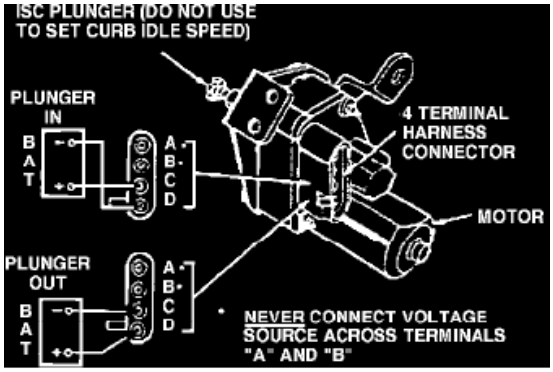
E 25.6 mm (1LL) 17.1 mm (43/64")

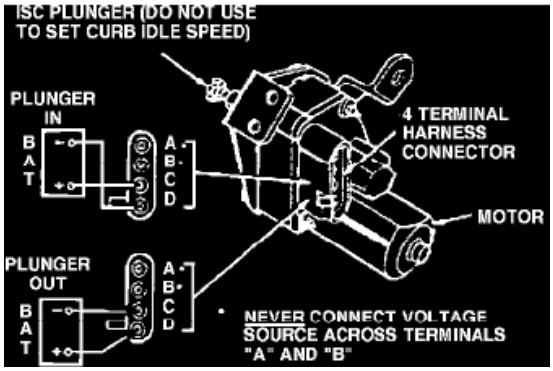
L 27.5 mm (1 -3/32") 19.0 mm (3/4")

J 30.0 mm (1-3/16") 21.5 mm (27/32")

N 32.0 mm (1-17/64") 23.5 mm (59/64")

T 34.0 mm (1-11/32") 25.5 mm (1")





Idle Speed Control Assembly - Typical

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures - see emission label for latest instructions.

2. Before starting engine, place transmission in PARK (AUTO trans.) or NEUTRAL (MANUAL transmission), set parking brake, and block drive wheels.

3. Connect dwell meter to mixture control (M/C) solenoid dwell lead. Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF".

5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary).

6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

7. Unplug connector from ISC motor.

8. Fully retract ISC plunger by applying 12 volts to terminal "C" and grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

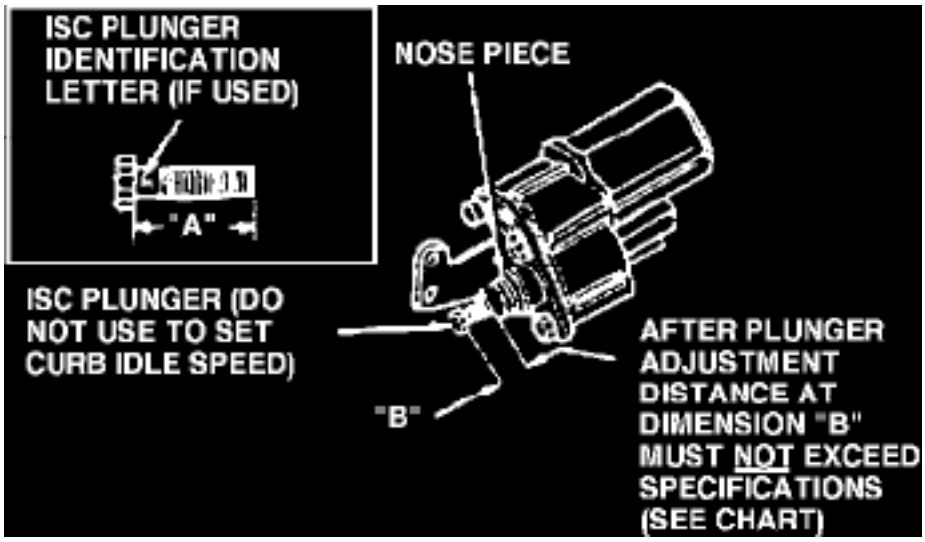
9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place A.T. transmission in Drive.

11. With ISC plunger fully retracted, adjust carburetor base (slow) idle stop screw (minimum authority) to the RPM shown in the carburetor charts.

12. PLACE TRANSMISSION IN PARK (AUTO TRANS.) OR NEUTRAL (MANUAL TRANS.).

Idle Speed Control Assembly - Typical



13. Fully extend ISC Plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC Motor Connection. Leave power

applied only long enough to extend the plunger.

14. Manual transmission: Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown

in carburetor charts.

15. Automatic Transmission:

a. With transmission in PARK, using Tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

b. With parking brake set and drive wheels blocked, place transmission in drive. Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown in carburetor charts.

Plunger - Maximum Adjustment

16. Recheck ISC "Maximum Authority" RPM with voltage applied to Motor (Step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nose piece, Dimension "B". Dimension must NOT exceed

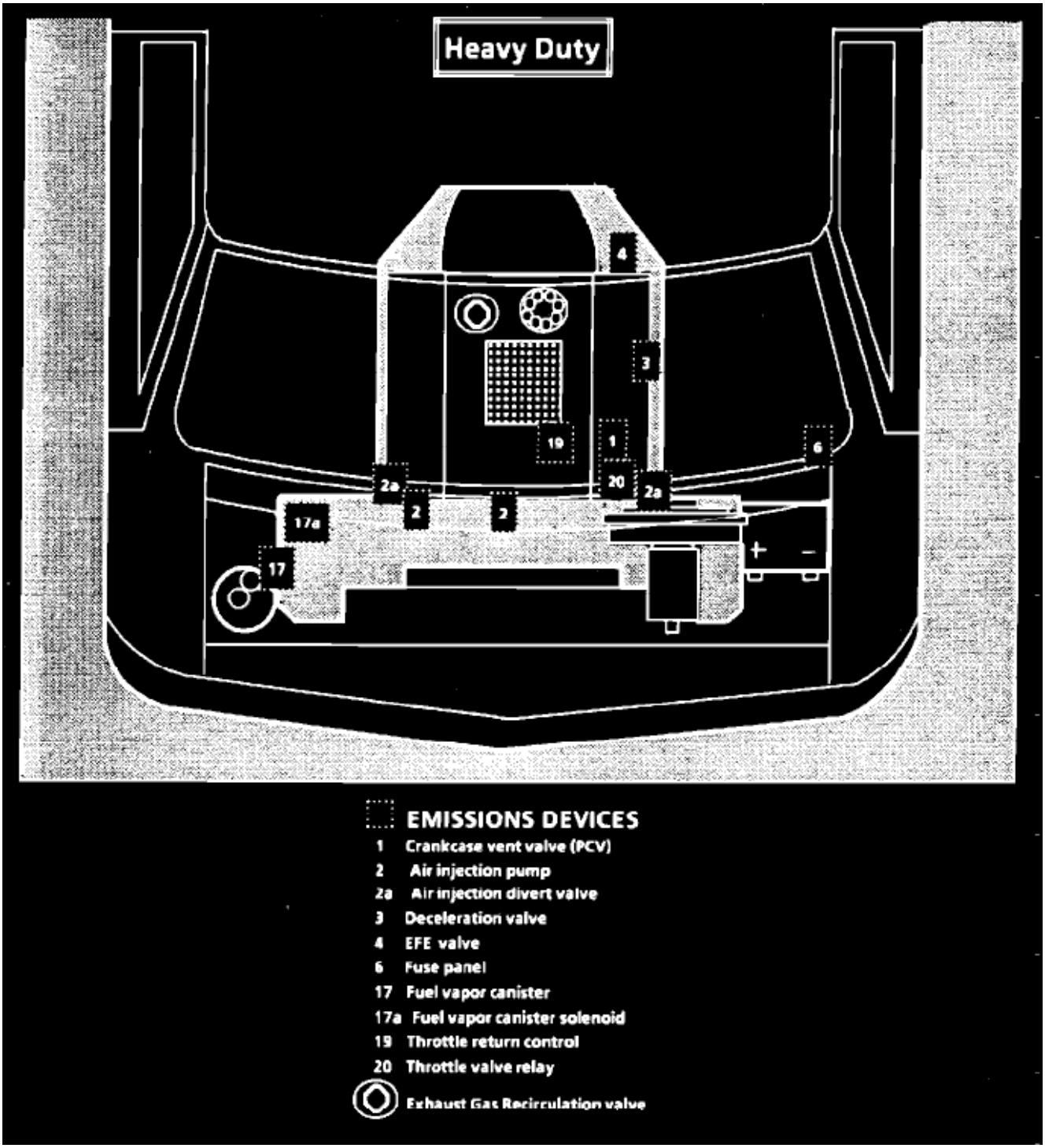
that shown by plunger type as either identified by plunger length or letter identification.

18. Fully retract ISC Plunger (Step 8). Place transmission in PARK (AUTO Trans.) or NEUTRAL (MANUAL Transmission) and turn ignition "Off".

Disconnect 12 Volt Power source, Ground lead, Tachometer and Dwell Meter. With ignition "Off" reconnect four Terminal Harness connectors to ISC Motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By restoring

the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.



Idle Up Control Relay: Locations

Underhood & Engine Components

LH Top Front Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Relays and Modules - Powertrain Management > Relays and Modules - Ignition System > Electronic Spark Timing <--> [Electronic Spark Control Module] > Component Information > Locations > Typical Electronic Spark System (ESC)

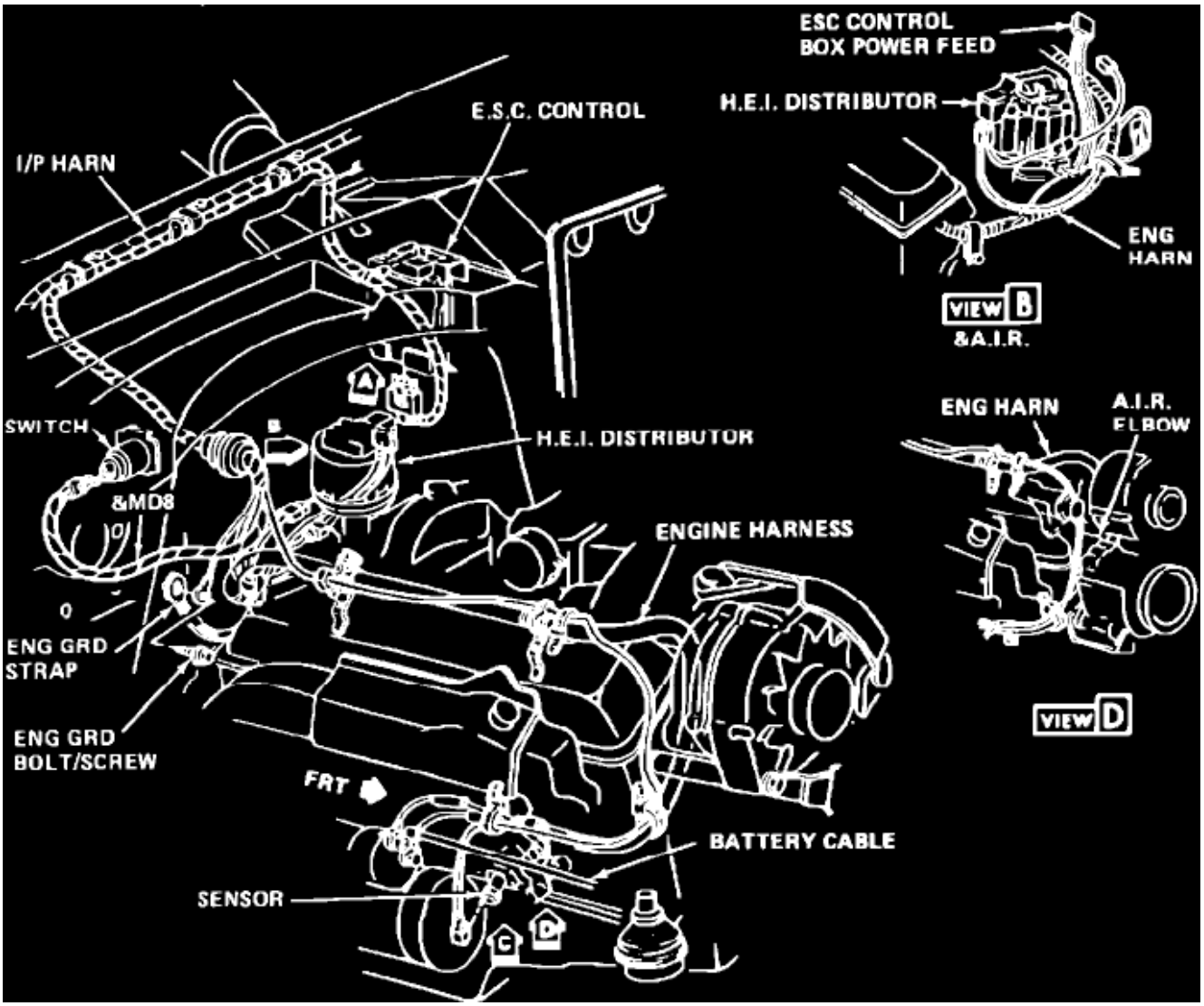


Fig. 46 Typical Electronic Spark System (ESC)

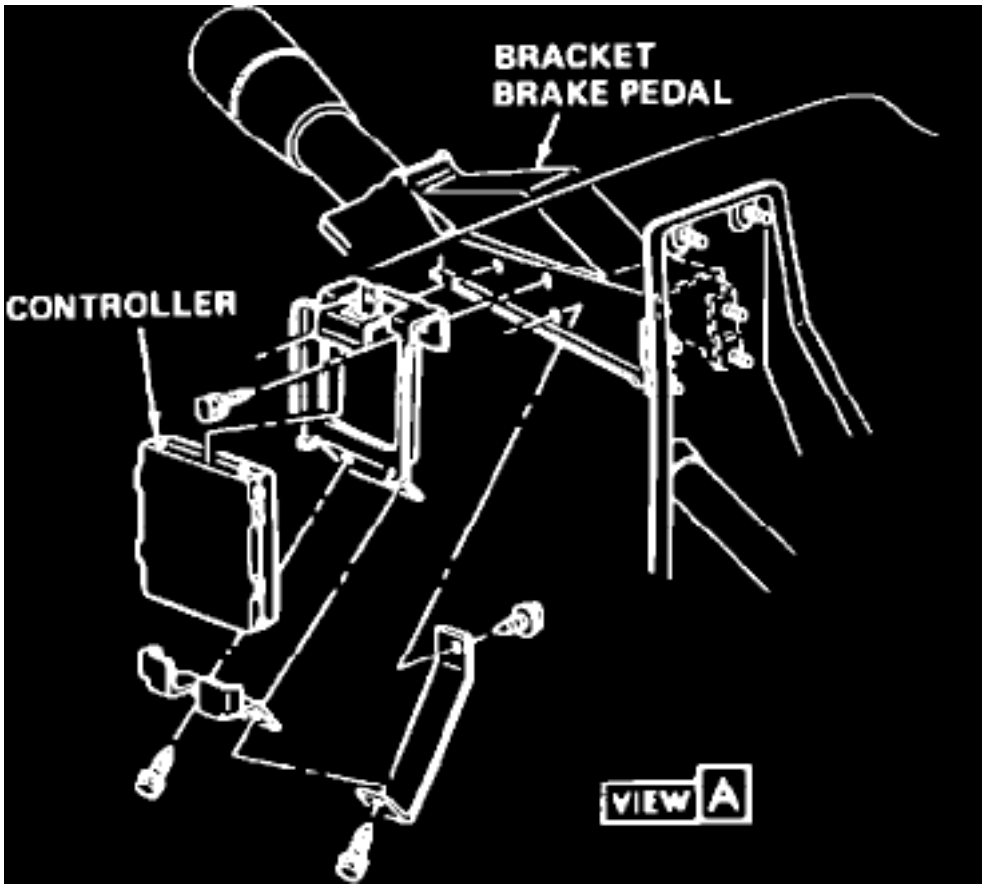
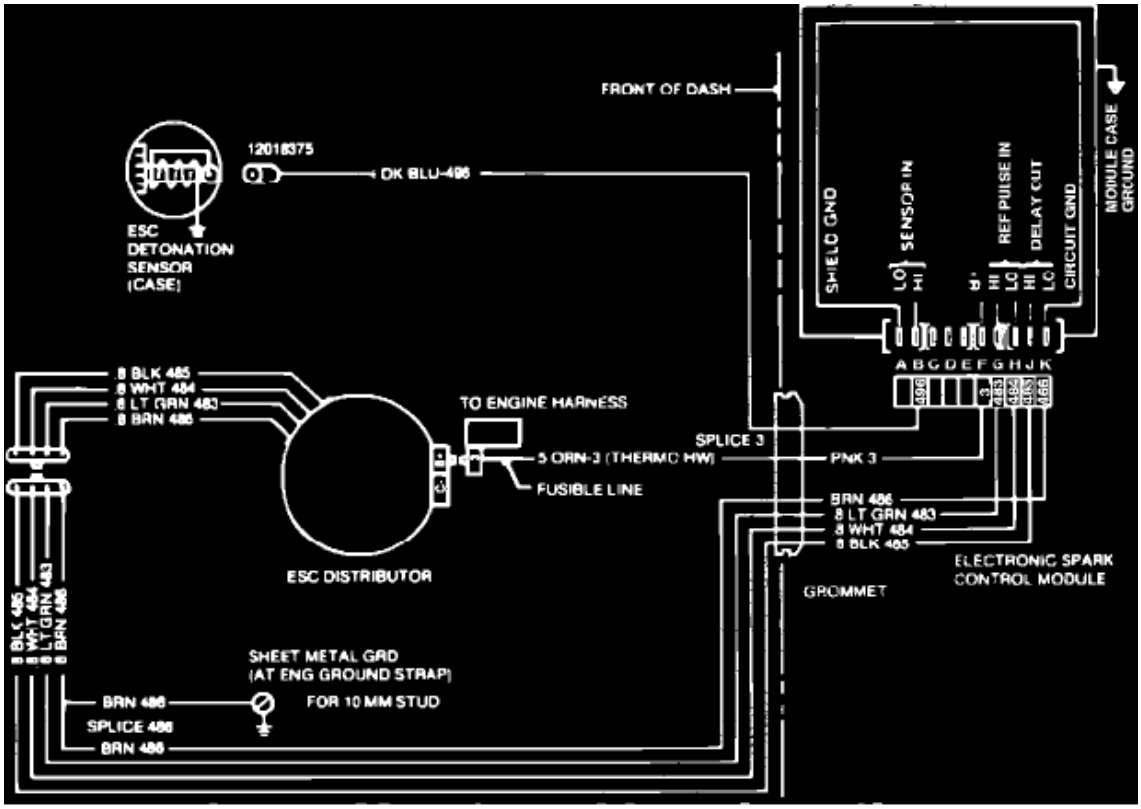
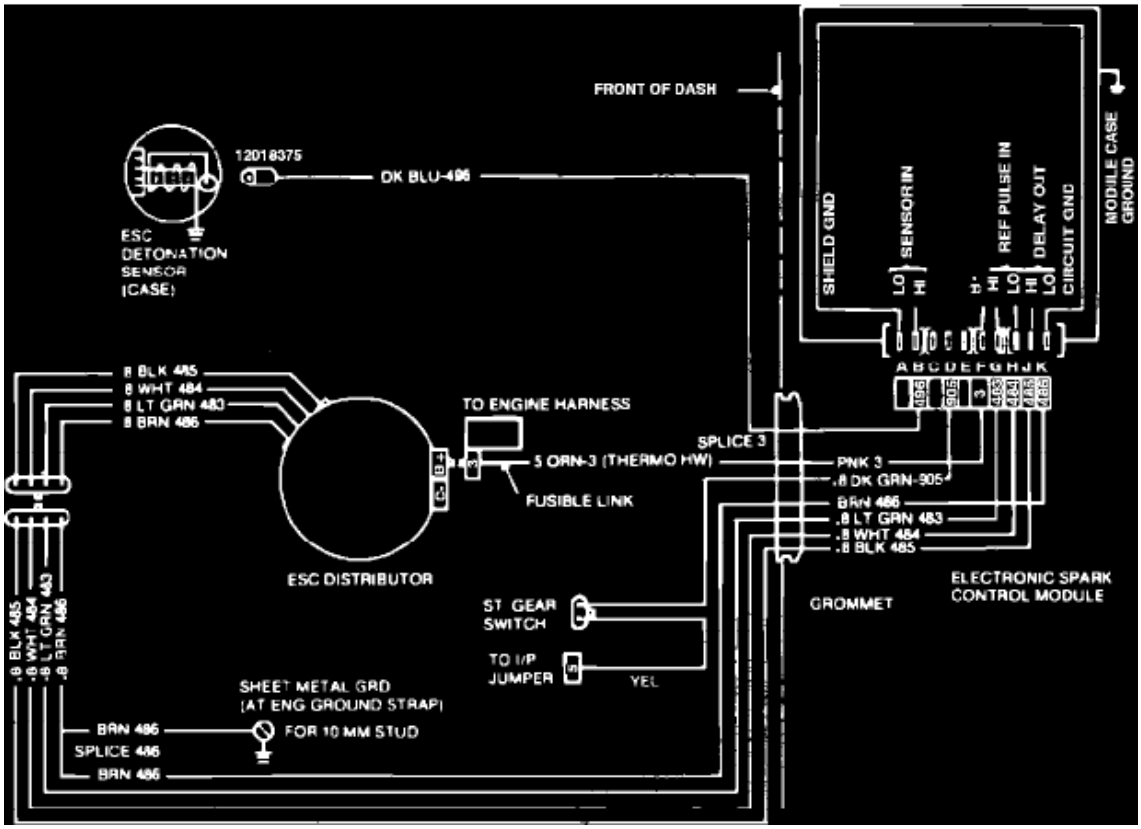


Fig. 47 Typical ESC Controller





Electronic Spark Timing: Testing and Inspection

Use the following procedures to diagnose ESC system malfunctions only. To diagnose general ignition system malfunctions, refer to ``High Energy Ignition (HEI) System Diagnosis.''

Fig. 5 ESC system wiring schematic. 1984-86 models w/manual 4 speed top loader transmission

Fig. 6 ESC system wiring schematic. 1984-86 models w/manual 3 & 4 speed side loader transmission

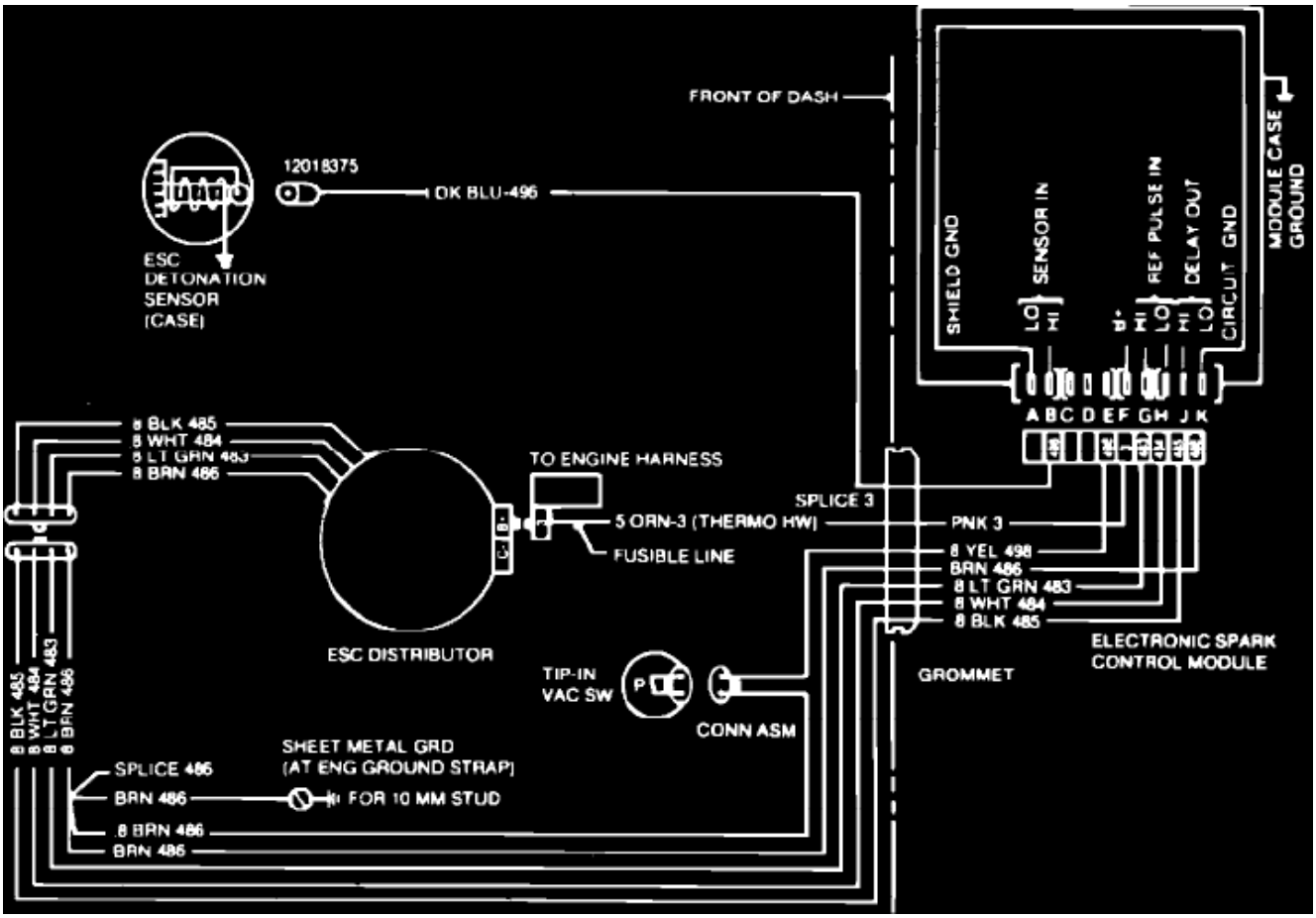


Fig. 7 ESC system wiring schematic. 1984-86 models w/auto. trans.

1984-86 MODELS

Engine Cranks But Will Not Start

1. Check for spark at at the ends of at least 2 spark plug wires using tester ST-125 or equivalent. If spark is observed, malfunction is not in ignition system.

2. If no spark is observed, disconnect 4 pin connector to distributor, connect jumper wire between pins A and C on distributor side of connector, Figs. 5, 6 and 7, and attempt to start engine. If engine starts, proceed to step 3. If engine does not start, proceed as follows:

a. Remove jumper wire and reconnect 4 pin connector to distributor. Turn on ignition and measure voltage at pins F and K of controller 10 pin

connector. If voltage is less than 11.6 volts, check feed circuit and repair as needed.

b. Set voltmeter on 2 volt scale and measure voltage between pins J and K of 10 pin connector while cranking engine. If reading is .75 volts or

greater, ESC system is satisfactory.

c. Set voltmeter on 2 volt scale and measure voltage between pins G and H of 10 pin connector while cranking engine. If reading is .20 volt or

greater, controller is defective. If reading is less than .20 volt, pole piece is defective.

3. Stop engine and remove jumper wire from distributor.

4. Connect suitable high resistance test lamp between distributor TACH terminal and ground, then turn on ignition. If test lamp lights, proceed to step 6.

5. If lamp does not light at TACH terminal, connect lamp between BAT terminal and ground and turn on ignition. If lamp does not light, repair feed circuit to ignition.

6. Crank engine with test lamp connected between distributor TACH terminal and ground. If test lamp flickers, system is satisfactory.

7. If test lamp does not flicker as engine is cranked, connect lamp between BAT terminal and pin A on distributor side of 4 pin ESC connector, then tap on coil. If coil makes a clicking noise when tapped, pole piece is defective.

8. If coil does not click, remove distributor cap an disconnect and reconnect pole piece electrical connector. If coil still does not click when tapped, ignition module is defective.

Poor Engine Performance

1. Disconnect distributor 4 pin connector, connect pins A and C on distributor side of connector with jumper wire, and road test vehicle.

2. If engine performance is still poor, cause is not in ESC system. If proper engine performance is restored by disconnecting ESC controller from distributor, remove jumper wire, reconnect 4 pin connector and proceed to next step.

3. Disconnect 10 pin connector from ESC controller, inspect terminals for proper contact, shots and opens, repair as needed, then recheck system operation.

4. If problem persists, disconnect 10 pin connector and measure resistance between pins B and K in connector. Reading should be 98-99 Kohms.

5. If resistance is not as specified, disconnect electrical connector from knock sensor and measure resistance between sensor terminal and ground. If resistance is 98-99 ohms, repair wiring between

knock sensor and controller. If resistance is not 98-99 Kohms, knock sensor is defective.

6. Reconnect 10 pin connector to controller and measure voltage between pins F and K with ignition on. If voltage reading is less than 11.6 volts repair feed circuit as needed.

7. Set voltmeter on 20 volt AC scale and measure voltage between connector pins H and K with ignition on. If reading is less than .20 volt, inspect system wiring and repair as needed. If reading is greater than .20 volt, ensure all connectors are properly seated, then road test vehicle. If problem persists, replace ESC controller.

Engine Detonation

1. Inspect connector and wiring to knock sensor and repair as needed.

2. Connect suitable spark advance tester to engine, run engine until it reaches normal operating temperature and set engine to run at a minimum of 1200 RPM, then observe ignition timing while tapping on exhaust manifold. If ignition timing retards when manifold is tapped, ESC system is operating properly.

3. Stop engine, disconnect 10 pin connector from ESC controller and measure resistance between pins B and K of connector. If resistance is not 98-99 ohms, proceed to step 5.

4. Measure resistance between pins H and K in connector. If resistance is 14-16 ohms, replace controller. If resistance is not 14-16 ohms, repair wiring to controller.

5. Disconnect electrical connector from knock sensor and measure voltage at sensor terminal with engine running at 2000 RPM. If reading is not .08 volt or more, knock sensor is defective.

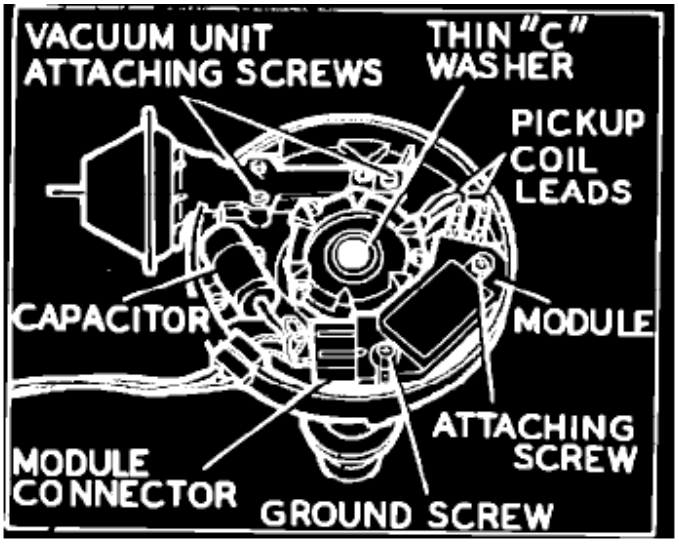
6. Stop engine. If knock sensor voltage output is satisfactory, check wiring between knock sensor and terminal B of controller and between controller terminal K and ground and repair as needed.

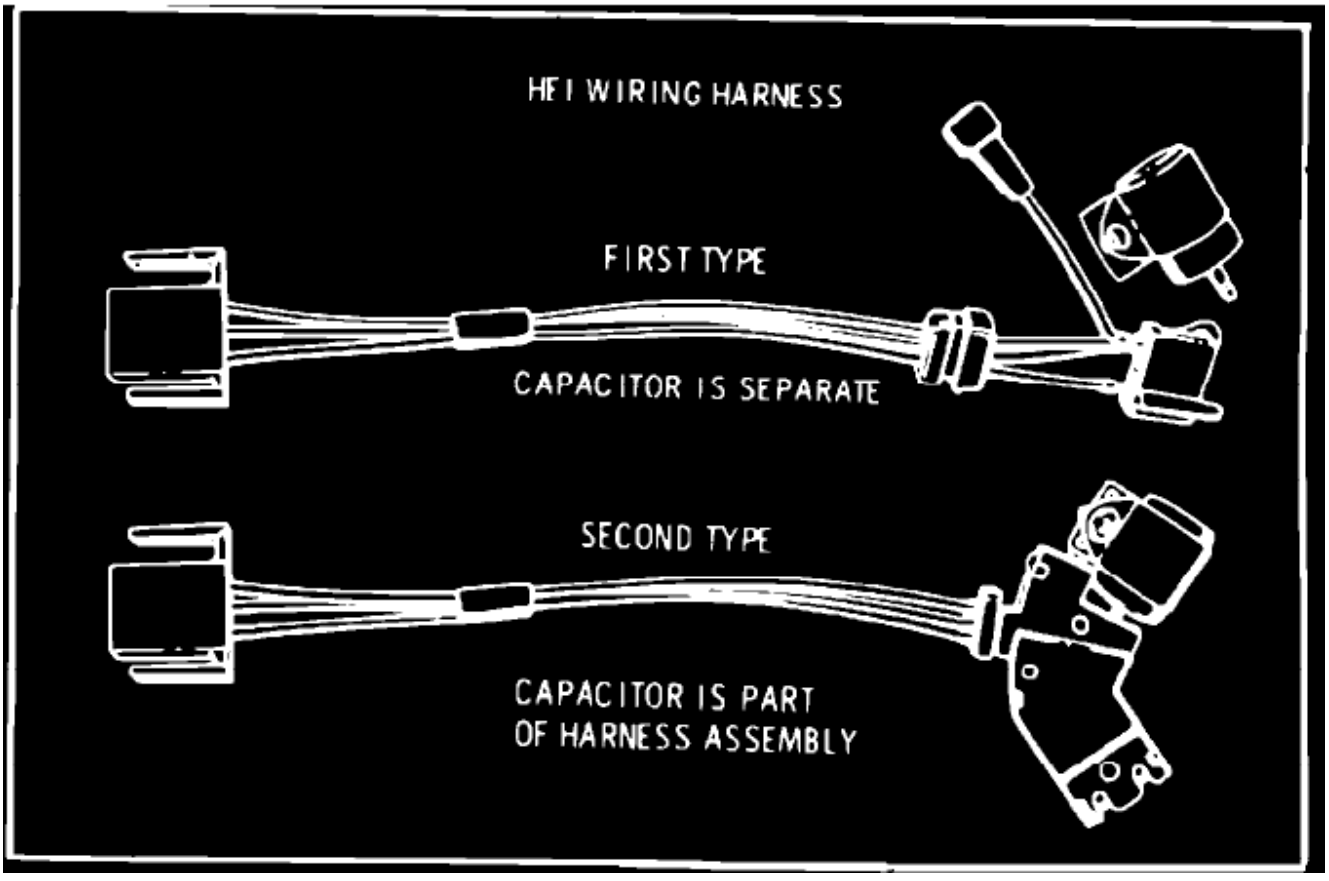
Ignition Control Module: Testing and Inspection

If the vehicle cranks for at least 5 seconds and the Engine Control Module doesn't see a referance signal, some Models will set a code, 42 (Hard) or 12 (Soft). If your vehicle has one of these codes, begin with the Diagnostic System Check in Computers and Controls, then proceed to the Trouble Code Chart (Yes, some vehicles have a DTC Chart for Code 12).

If the vehicle does not set a code, begin with the Diagnostic System Check, and it will send you to a Diagnostic Chart that checks for your particular condition.

These types of tests are found under Computers and Control Systems. See: Computers and Control Systems/Testing and Inspection





Ignition Control Module: Service and Repair

Fig. 13 Distributor component identification

Fig. 14 Ignition module harness identification

1. Disconnect wiring harness connector at side of distributor cap and remove distributor cap.

2. Remove rotor and disconnect wires from module terminals.

3. Remove two mounting screws and remove module, Fig. 13. Two types of H.E.I. wiring harness are used, Fig. 14. The second type is a wiring harness, connector and capacitor which is serviced as an assembly.

4. Reverse procedure to install. Prior to installation, coat bottom of new module with dielectric grease (furnished with new module) to aid in heat transfer into distributor housing. Failure to apply grease will cause excessive heat at module and premature module failure.

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-90	Barometric, Manifold Absolute	3.8-5.5 @ 0-1000 3.6-5.3 @ 1000-200 3.5-5.1 @ 2000-300 3.3-5.0 @ 3000-400 3.2-4.8 @ 4000-500 3.0-4.6 @ 5000-600 2.9-4.5 @ 6000-700 2.5-4.3 @ 7000-

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-88	Vacuum	.50-.64 @ ign. on 1.7-3.0*

* 10 in./250 mm applied to unit.

Absolute Pressure Sensor: Specifications

MANIFOLD ABSOLUTE, VACUUM AND BAROMETRIC PRESSURE SENSORS

Engines may use one, or a combination of these sensors. All sensors appear the same. Manifold Absolute Pressure sensors have a vacuum line connected between the unit and manifold vacuum. On Barometric Pressure sensors, the line is not used and the connector is either open or has a filter installed over it. Pressure sensors also have a vacuum line between the sensor and intake manifold and only appear on carburetted models.

Barometric Pressure Sensors: Measure voltage with ignition on and engine off.

Manifold Absolute Pressure Sensors: Measure voltage with ignition on and engine off. Start engine and apply 10 in./ 250 mm Hg to unit, voltage should be 1.2-2.3 volts less.

Pressure Sensors: Measure voltage as indicated.

Absolute Pressure Sensor: Description and Operation

The barometric pressure sensor senses changes in barometric pressure and provides this information, through an electrical signal, to the ECM. The sensor produces a voltage signal of 3.5 - 4 volts to indicate barometric pressure. The voltage increases in proportion to increases in altitude (decreases in barometric pressure). This sensor is normally used with the MAP sensor.

Absolute Pressure Sensor: Service and Repair

The MAP and Vacuum sensors are accessible through the engine compartment. The BARO sensor may be located either in the engine compartment or strapped to the ECM harness under the dash panel.

Other than checking for loose hoses and electrical connections, the only service required of these sensors is replacement should diagnosis show any sensors to be faulty.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

The coolant temperature sensor supplies coolant temperature information to the ECM. It is mounted in the engine coolant stream and has high resistance when the engine is cold and low resistance when the engine is warm. The ECM receives this information and controls the various systems that are dependent on temperature for proper operation.

Coolant Temperature Sensor/Switch (For Computer): Service and Repair

1. Disconnect electrical connector and remove sensor.
2. Reverse procedure to install. Torque sensor to 72 in lbs.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Sensors and Switches - Powertrain Management > Sensors and Switches - Computers and Control Systems > Engine Speed Signal <--> [Engine Speed Sensor] > Component Information > Description and Operation

Engine Speed Signal: Description and Operation

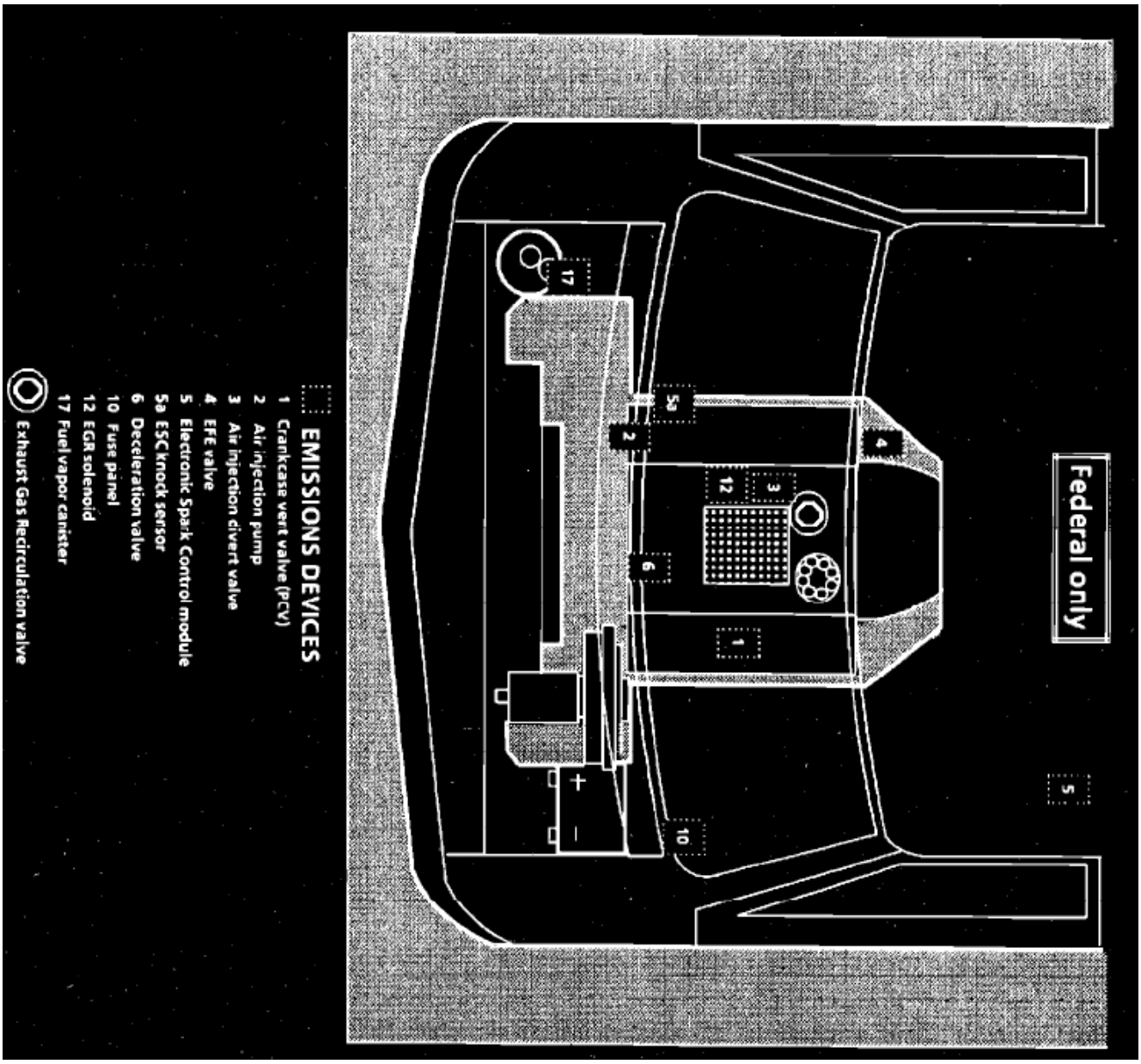
On all models with full function systems except V6-229 (1983 - 84 VIN code 9) engines, the ``R'' terminal on the 7 terminal ignition module provides reference pulses to the ECM indicating engine RPM and crankshaft position.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Sensors and Switches - Powertrain Management > Sensors and Switches - Computers and Control Systems > Knock Sensor > Component Information > Locations > Electronic Spark Control Knock Sensor

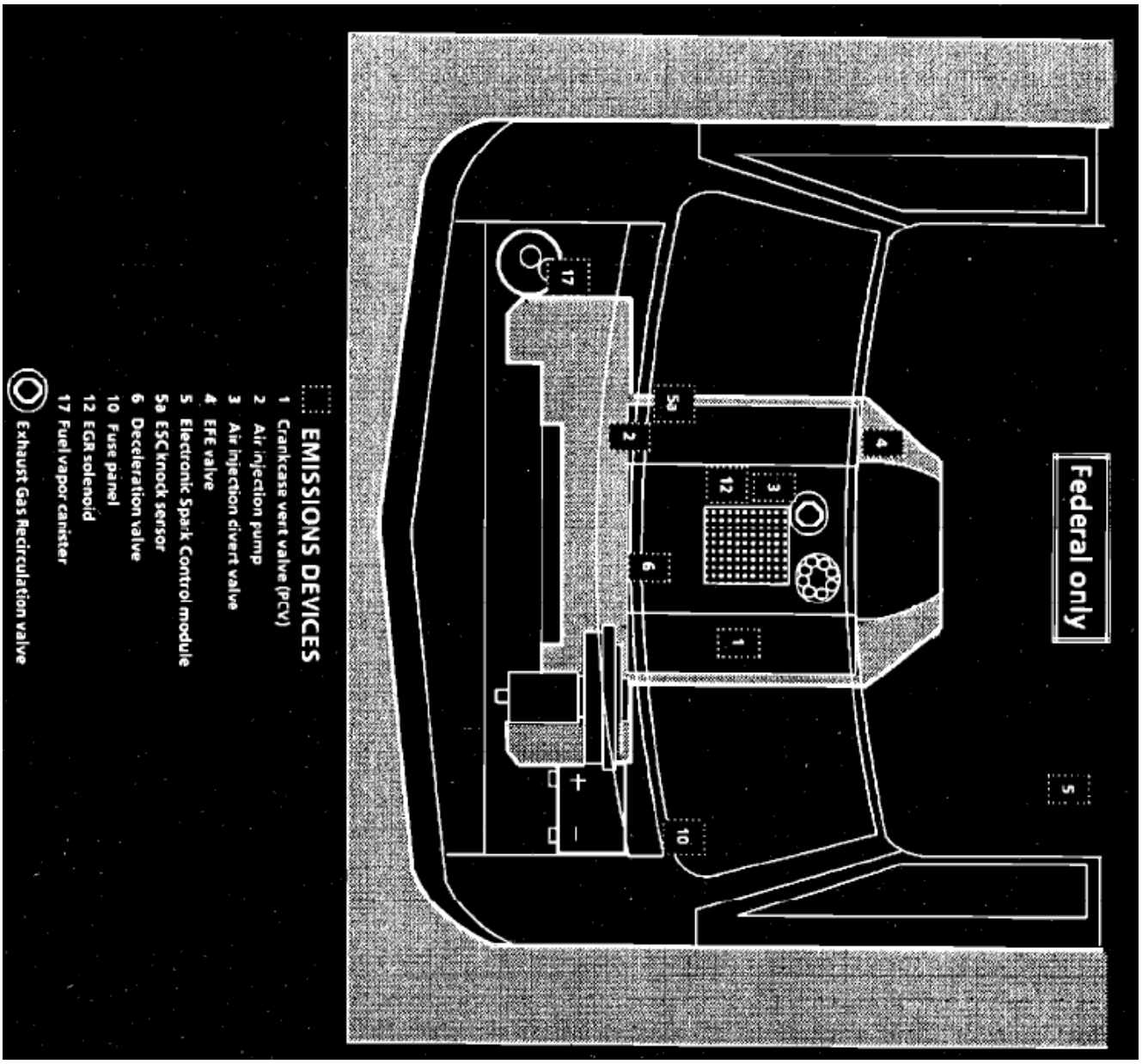


Knock Sensor: Locations Electronic Spark Control Knock Sensor

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Knock Sensor: Locations Electronic Spark Control Module

Underhood & Engine Components.

Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

Manifold Pressure/Vacuum Sensor: Technical Service Bulletins MAP - Revised Check Chart for DTC's 33, 34, 63, 64

Number: 90-199-6E

Section: 6E

Date: March 1990

Corporate Bulletin No.: 016510

Subject: REVISED CHART C-1D, CODE 33, 34, 63, 64

Model and Year: 1980-90 PASSENGER CARS AND TRUCKS

TO: ALL CHEVROLET DEALERS

This bulletin revises the Manifold Absolute Pressure (MAP) Output Check Chart C-1D and updates Code 33, Code 34, Code 63, and Code 64 in the Service Manual section on "Driveability And Emissions" (Section 6E1, 6E2, and 6E3). This information applies to all MAP Sensors on 1980-1990 vehicles with gasoline engines (except turbocharged) with green (standard) MAP sensor electrical connector insert or the solid black MAP sensor electrical connector insert.

The revised chart information:

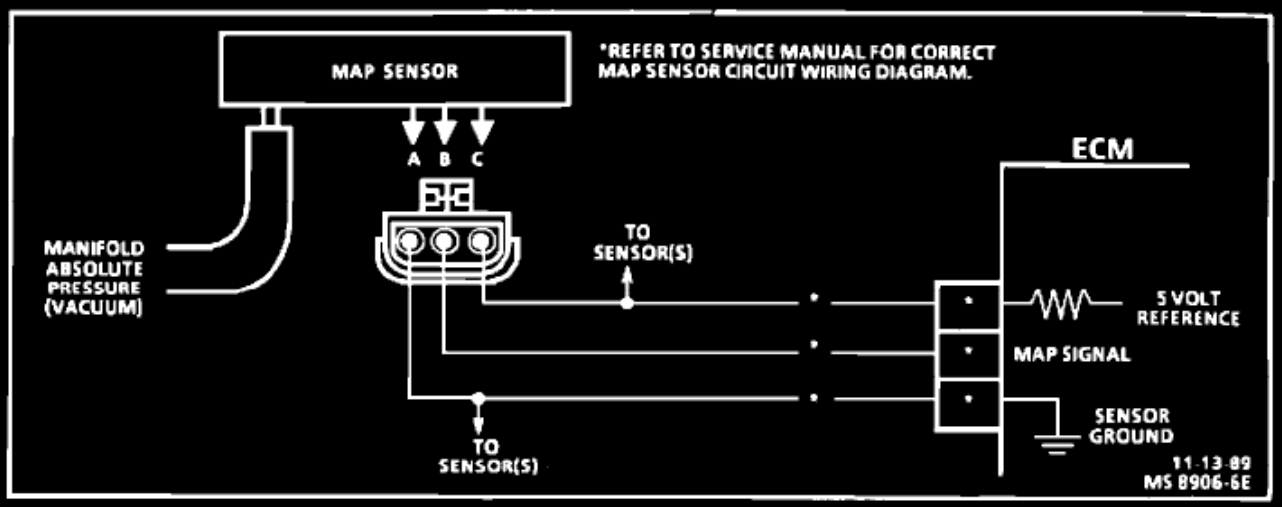


CHART C-1D

MANIFOLD ABSOLUTE PRESSURE (MAP) VOLTAGE OUTPUT CHECK

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor measures the changes in the intake manifold pressure which result from engine load (intake manifold vacuum) and rpm changes; and converts these into a voltage output. The ECM sends a 5 volt reference voltage to the MAP sensor. As the manifold pressure changed, the output voltage of the sensor also changes. By monitoring the sensor output voltage, the ECM knows the manifold pressure. A lower pressure (low voltage) output voltage will be about 1 - 2 volts at idle. While higher pressure (high voltage) output voltage will be about 4 - 4.8 at Wide Open Throttle (WOT). The MAP sensor is also used, under certain conditions, to measure barometric pressure, allowing the ECM to make adjustments for different altitudes. The ECM uses the MAP sensor to control fuel delivery and ignition timing.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

Important

- Be sure to use the same Diagnostic Test Equipment for all measurements.

1. When comparing "Scan" readings to a known good vehicle, it is important to compare vehicles that use a MAP sensor having the same color insert or having the same "Hot Stamped" number. See figures on facing page.
2. Applying 34 kPa (10" Hg) vacuum to the MAP sensor should cause the voltage to change. Subtract second reading from the first. Voltage value should be greater than 1.5 volts. Upon applying vacuum to the sensor, the change in voltage should be instantaneous. A slow voltage change indicates a faulty sensor.
3. Check vacuum hose to sensor for leaking or restriction. Be sure that no other vacuum devices are connected to the MAP hose.

NOTE: Make sure electrical connector remains securely fastened.

4. Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connection. Output changes greater than 1 volt indicate a bad connector or connection. If OK, replace sensor.

CHART C-1D

MANIFOLD ABSOLUTE PRESSURE (MAP) VOLTAGE OUTPUT CHECK

NOTE: THIS CHART ONLY APPLIES TO MAP SENSORS HAVING GREEN OR BLACK COLOR KEY INSERT (SEE BELOW).

1. • IGNITION "ON," ENGINE "OFF."
   • "SCAN" TOOL SHOULD INDICATE A MAP SENSOR VOLTAGE.
   • COMPARE THIS READING WITH THE READING OF A KNOWN GOOD VEHICLE. SEE FACING PAGE TEST DESCRIPTION, STEP 1.
   • VOLTAGE READING SHOULD BE WITHIN, ± .4 VOLT.
   IS IT?

YES

2. • DISCONNECT AND PLUG VACUUM SOURCE TO MAP SENSOR.
   • CONNECT A HAND VACUUM PUMP TO MAP SENSOR.
   • START ENGINE.
   • NOTE MAP SENSOR VOLTAGE.
   • APPLY 34 kPa (10" Hg) OF VACUUM AND NOTE VOLTAGE CHANGE. SUBTRACT SECOND READING FROM THE FIRST. VOLTAGE VALUE SHOULD BE GREATER THAN 1.5 VOLTS.
   IS IT?

YES

3. NO TROUBLE FOUND. CHECK SENSOR VACUUM SOURCE FOR LEAKAGE OR RESTRICTION. BE SURE THIS SOURCE SUPPLIES VACUUM TO MAP SENSOR ONLY.

NO

REPLACE SENSOR.

NO

4. CHECK SENSOR CONNECTION. IF OK, REPLACE SENSOR.

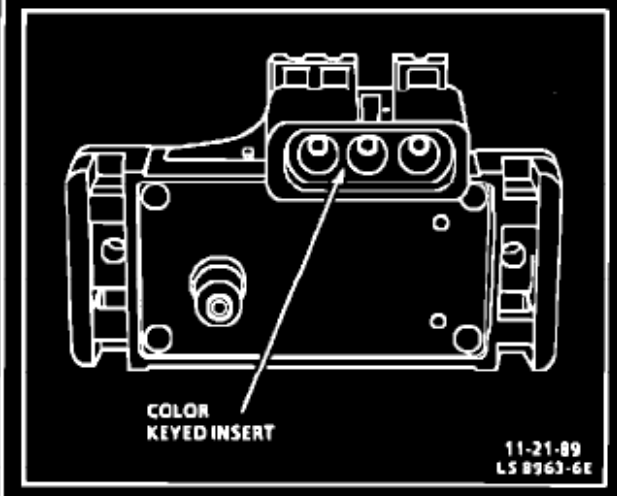


Figure 1 - Color Key Insert

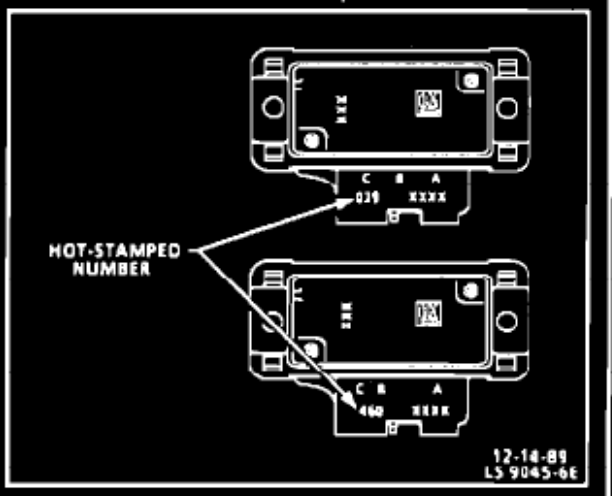


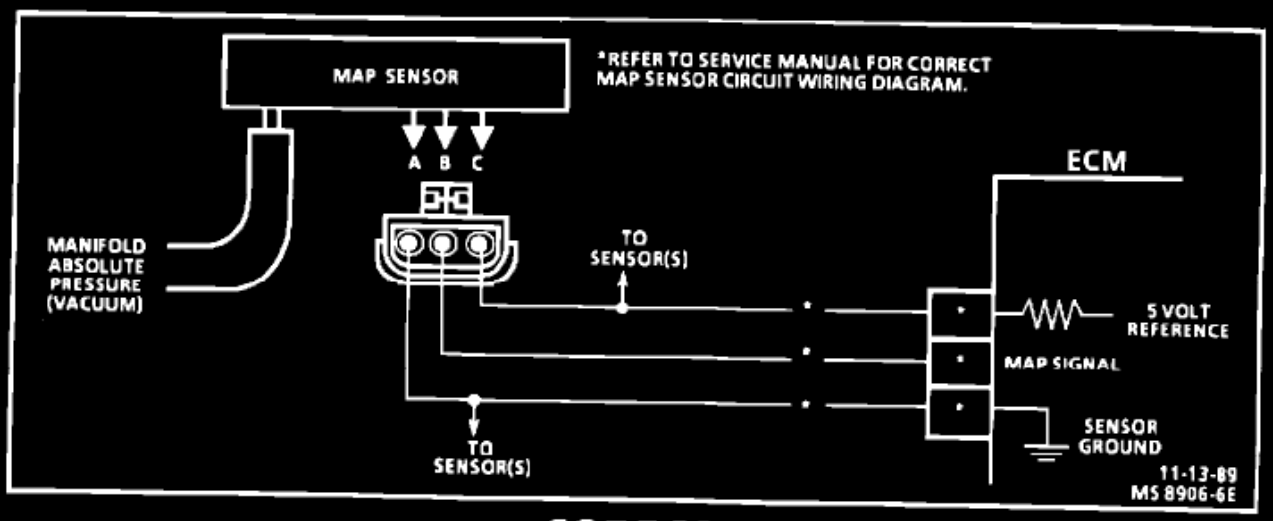
Figure 2 - Hot-Stamped Number

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "SERVICE ENGINE SOON" LIGHT.

2-28-90
• 753162-6E

- Diagnostic Chart C-1D.

The updated chart information:



CODE 33

MANIFOLD ABSOLUTE PRESSURE (MAP) OUTPUT CHECK
(SIGNAL VOLTAGE HIGH - LOW VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. This step will determine if Code 33 is the result of a hard failure or an intermittent condition.
   A Code 33 will set under the following conditions:
   - MAP signal voltage is too high (low vacuum).
   - TPS less than 2%.
   - These conditions exist longer than 5 seconds.
2. This step simulates conditions for a Code 34. If the ECM recognizes the change, the ECM and CKT 416 and CKT 432 are OK. If CKT 469 is open, there may also be a stored Code 23.

Diagnostic Aids:

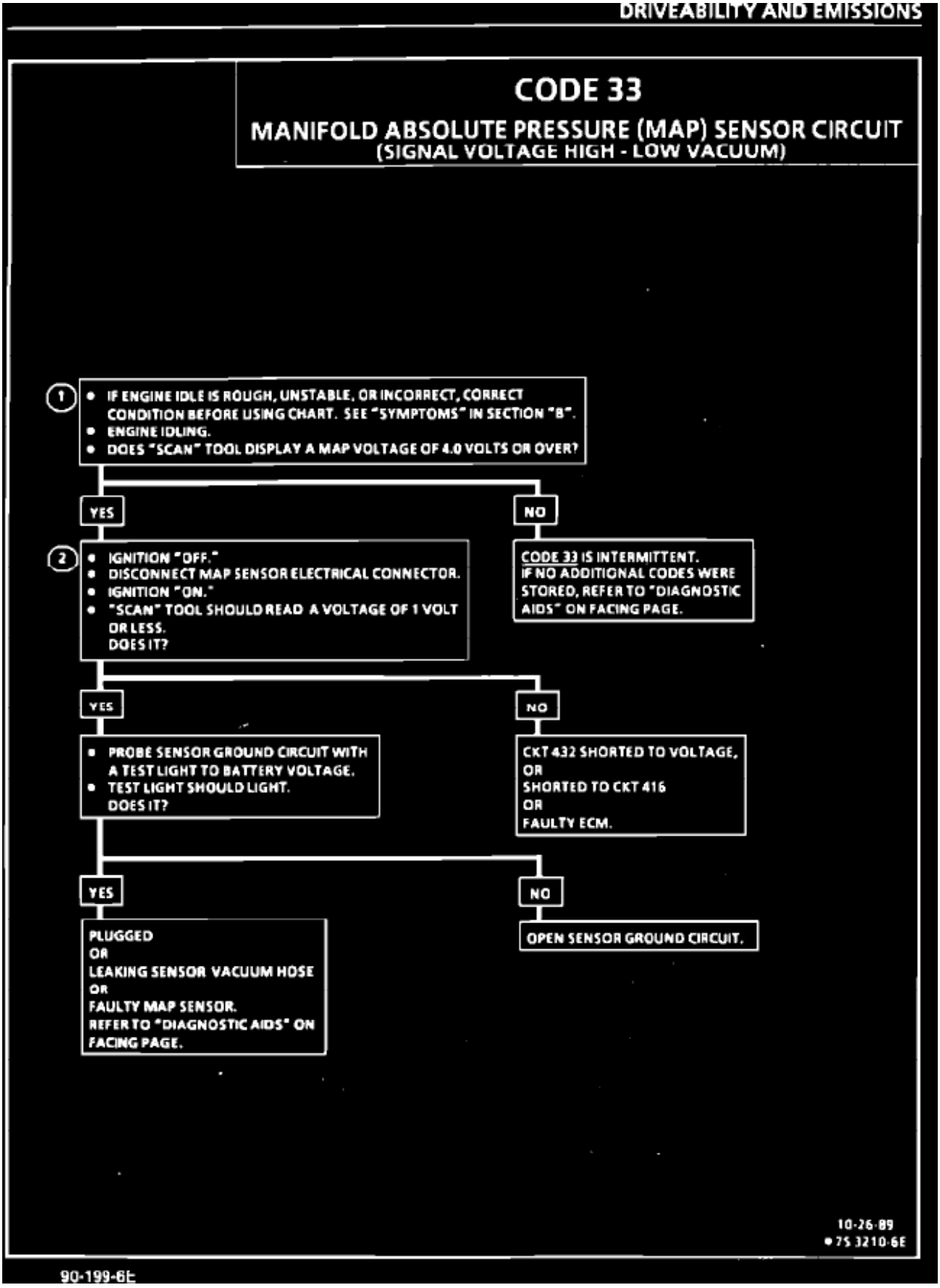
With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volt.

A Code 33 will result if CKT 469 is open or if CKT 432 is shorted to voltage or to CKT 416.

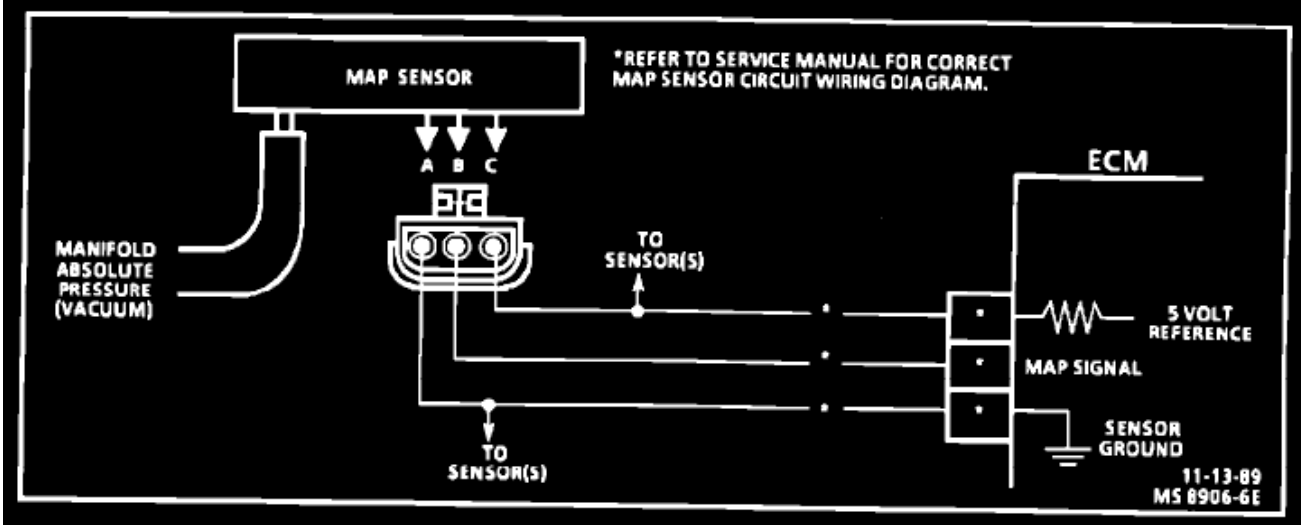
If Code 33 is intermittent, refer to Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.



- Diagnostic Chart Code 33.



CODE 34

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. This step determines if Code 34 is the result of a hard failure or an intermittent condition. A Code 34 will set when MAP signal voltage is too low and the ignition is "ON."
2. Jumpering harness terminals "B" to "C" (5 volts to signal circuit) will determine if the sensor is at fault, or if there is a problem with the ECM or wiring.
3. The "Scan" tool may not display 5 volts. The important thing is that the ECM recognizes the voltage as more than 4 volts, indicating that the ECM and CKT 432 are OK.

Diagnostic Aids:

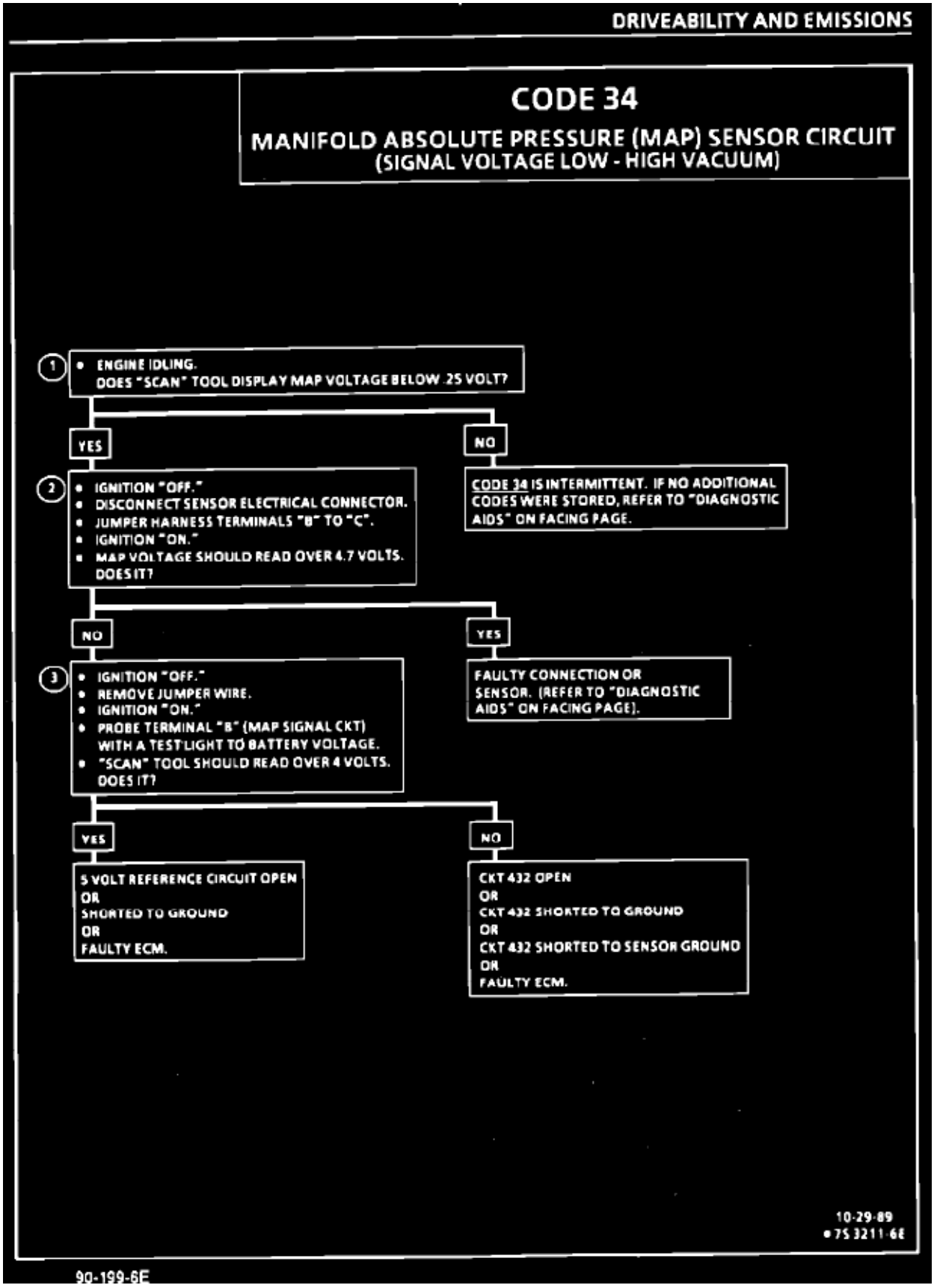
An intermittent open in CKT 432 or CKT 416 will result in a Code 34. With the ignition "ON" and the engine "OFF," the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude.

Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volts. Also CHART C-1D can be used to test the MAP sensor. Refer to "Intermittents" in Section "B".

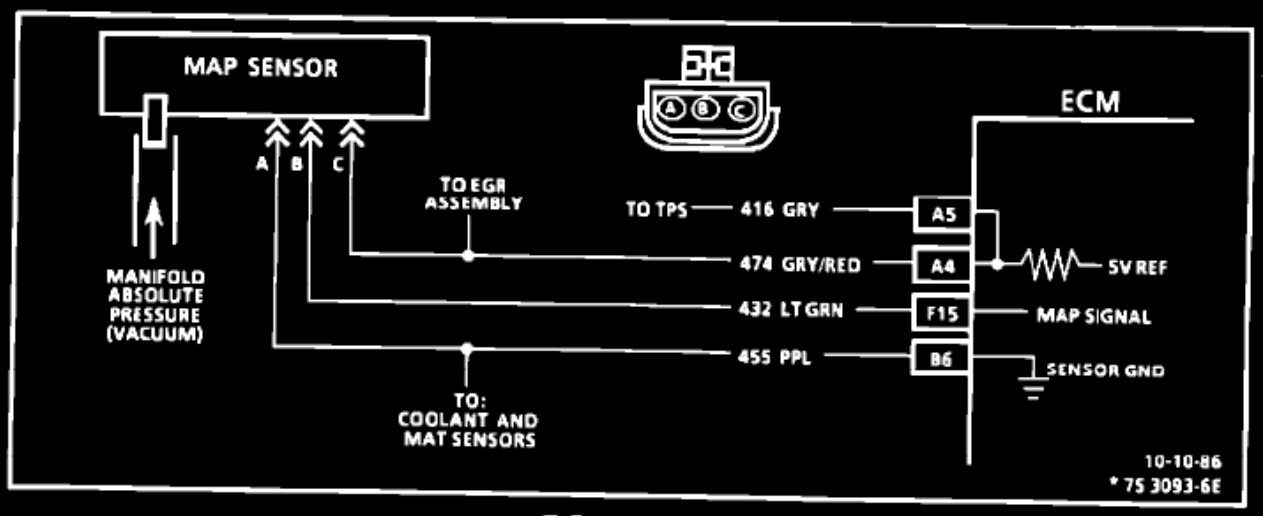
NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor By hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.

90-199-6E



- Diagnostic Chart Code 34.



CODE 63

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE HIGH - LOW VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 63 will set when:
   - Engine running.
   - Manifold pressure greater than 75.3 kPa (A/C "OFF") 81.2 kPa (A/C "ON").
   - Throttle angle less than 2%.
   - Conditions met for 2 seconds.

   Engine misfire or a low unstable idle may set Code 63.
2. With the MAP sensor disconnected, the ECM should see a low voltage if the ECM and wiring are OK.

Diagnostic Aids:

With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volt.

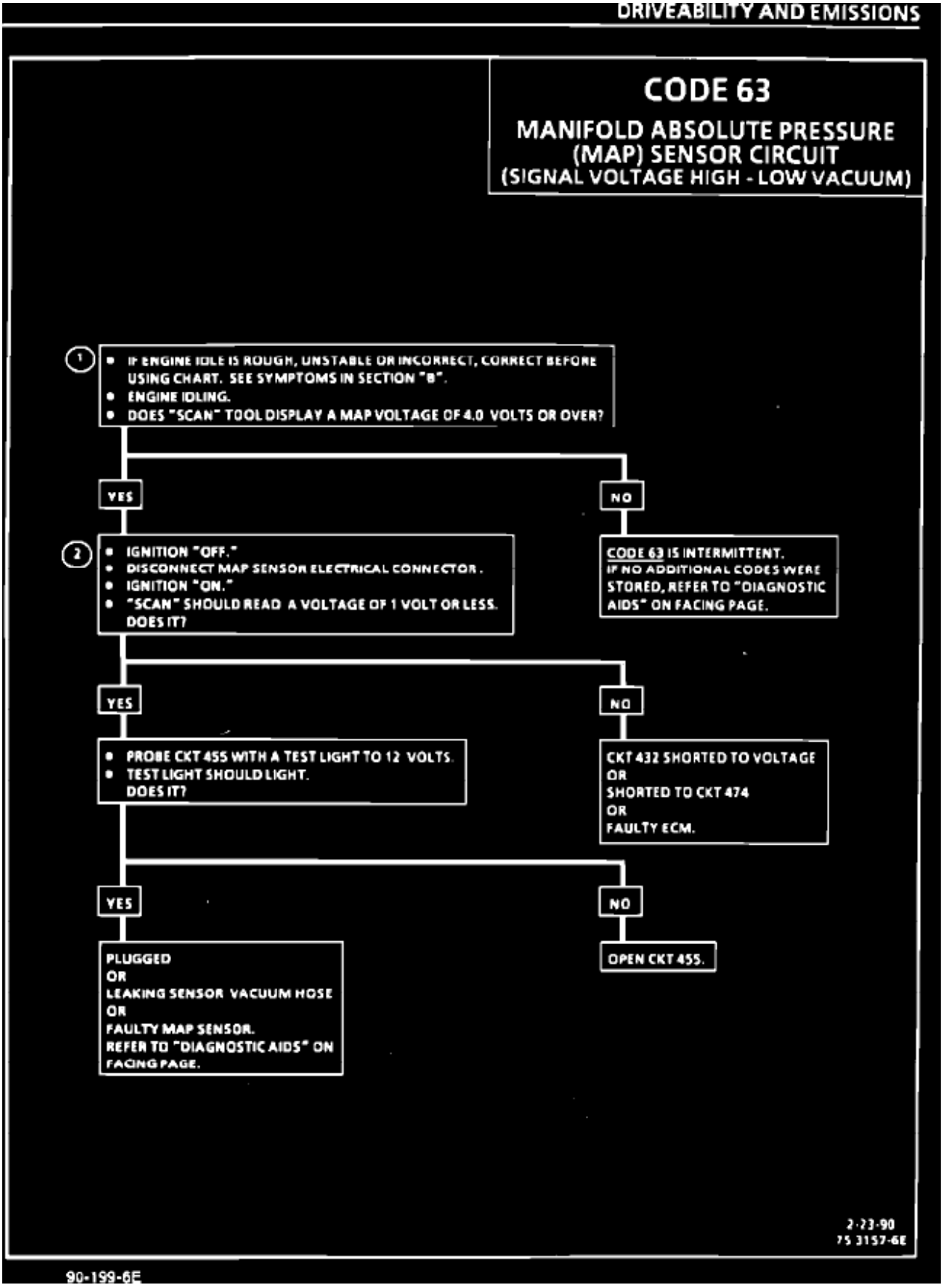
If idle is rough or unstable, refer to symptoms in Section "B" for items which can cause an unstable idle.

An open in CKT 455 or the connection will result in a Code 63.

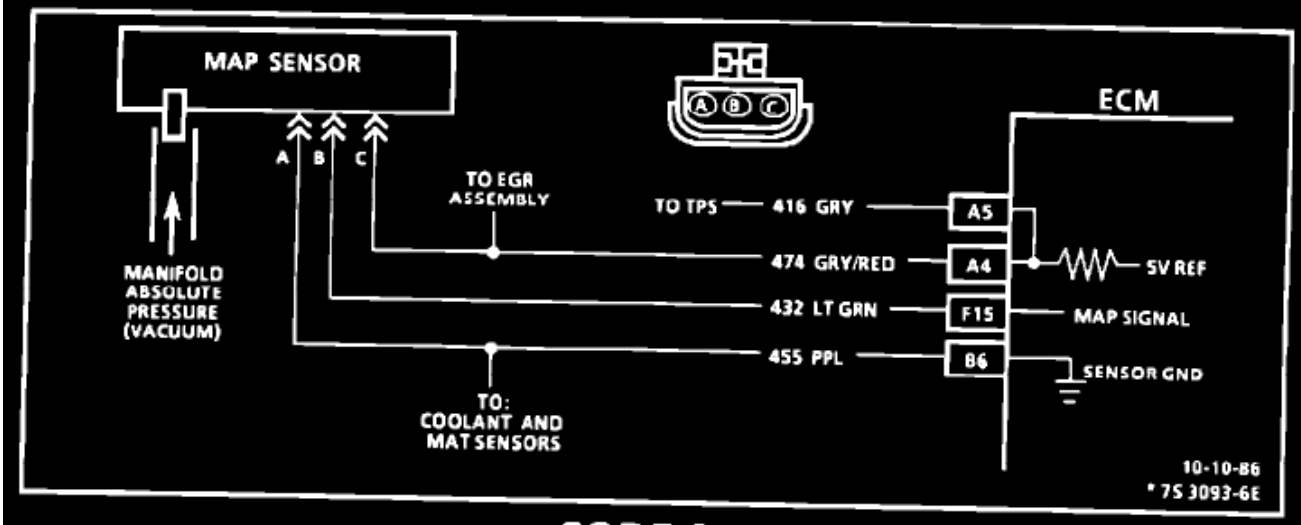
NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.

90-199-6E



- Diagnostic Chart Code 63.



CODE 64

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 64 will set if:
   - Engine rpm less than 600.
   - Manifold pressure reading less than 13 kPa.
   - Conditions met for 1 second.

   or
   - Engine rpm greater than 600.
   - Throttle angle over 20%.
   - Manifold pressure less than 13 kPa.
   - Conditions met for 1 second.
2. This test to see if the sensor is at fault for the low voltage, or if there is an ECM or wiring problem.
3. This simulates a high signal voltage to check for an open in CKT 432. If the test light is bright during this test, CKT 432 is probably shorted to ground. If "Scan" reads over 4 volts at this test, CKT 474 can be checked by measuring the voltage at terminal "C" (should be 5 volts).

Diagnostic Aids:

An intermittent open in CKTs 432 or 474 will result in a Code 64.

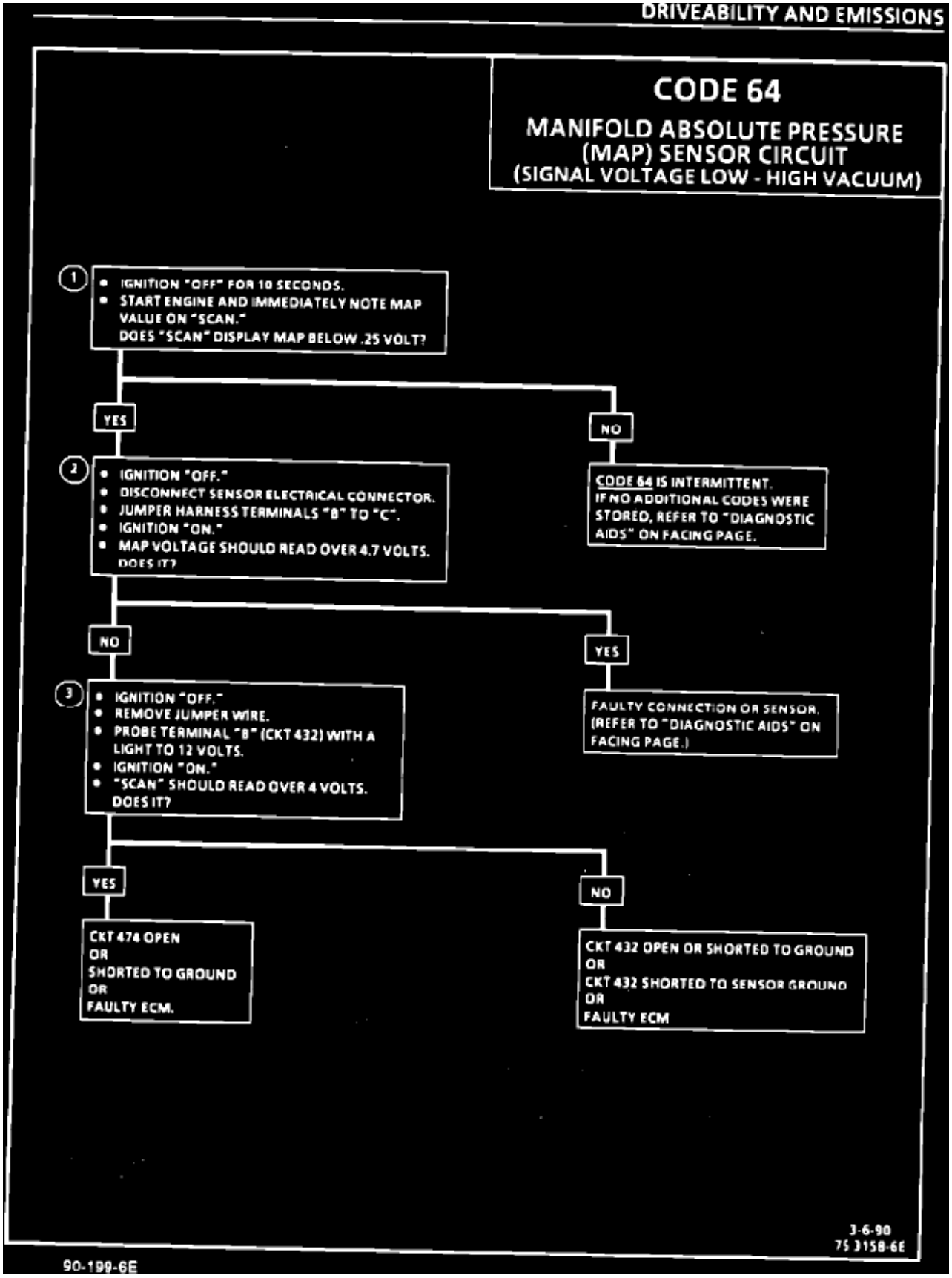
With the ignition "ON" and the engine "OFF," the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude.

Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volts. Also CHART C-1D can be used to test the MAP sensor. Refer to "Intermittents" in Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor By hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.

90-199-6E



- Diagnostic Chart Code 64.

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-90	Barometric, Manifold Absolute	3.8-5.5 @ 0-1000 3.6-5.3 @ 1000-200 3.5-5.1 @ 2000-300 3.3-5.0 @ 3000-400 3.2-4.8 @ 4000-500 3.0-4.6 @ 5000-600 2.9-4.5 @ 6000-700 2.5-4.3 @ 7000-

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-88	Vacuum	.50-.64 @ ign. on 1.7-3.0*

* 10 in./250 mm applied to unit.

Manifold Pressure/Vacuum Sensor: Specifications

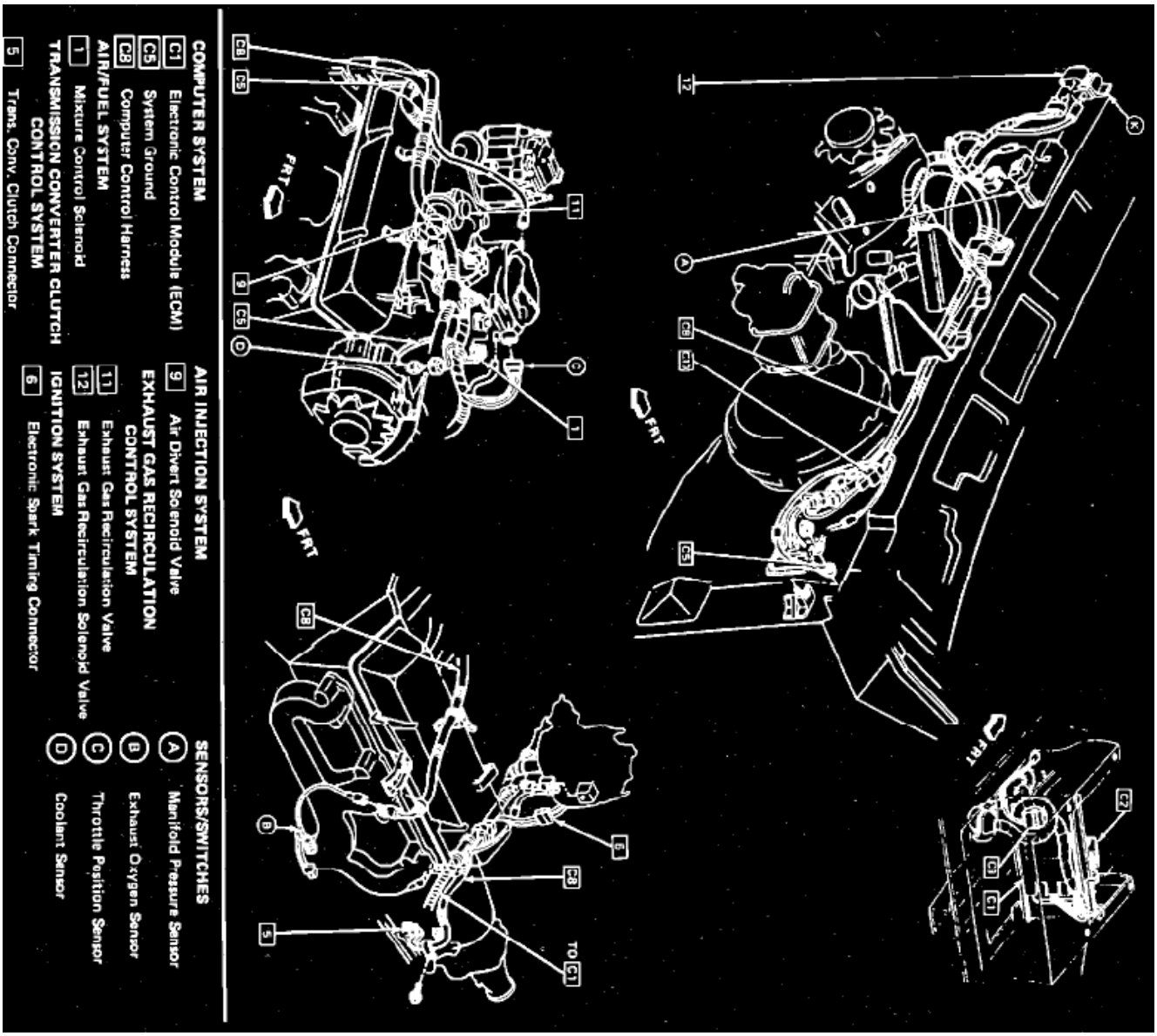
MANIFOLD ABSOLUTE, VACUUM AND BAROMETRIC PRESSURE SENSORS

Engines may use one, or a combination of these sensors. All sensors appear the same. Manifold Absolute Pressure sensors have a vacuum line connected between the unit and manifold vacuum. On Barometric Pressure sensors, the line is not used and the connector is either open or has a filter installed over it. Pressure sensors also have a vacuum line between the sensor and intake manifold and only appear on carburetted models.

Barometric Pressure Sensors: Measure voltage with ignition on and engine off.

Manifold Absolute Pressure Sensors: Measure voltage with ignition on and engine off. Start engine and apply 10 in./ 250 mm Hg to unit, voltage should be 1.2-2.3 volts less.

Pressure Sensors: Measure voltage as indicated.

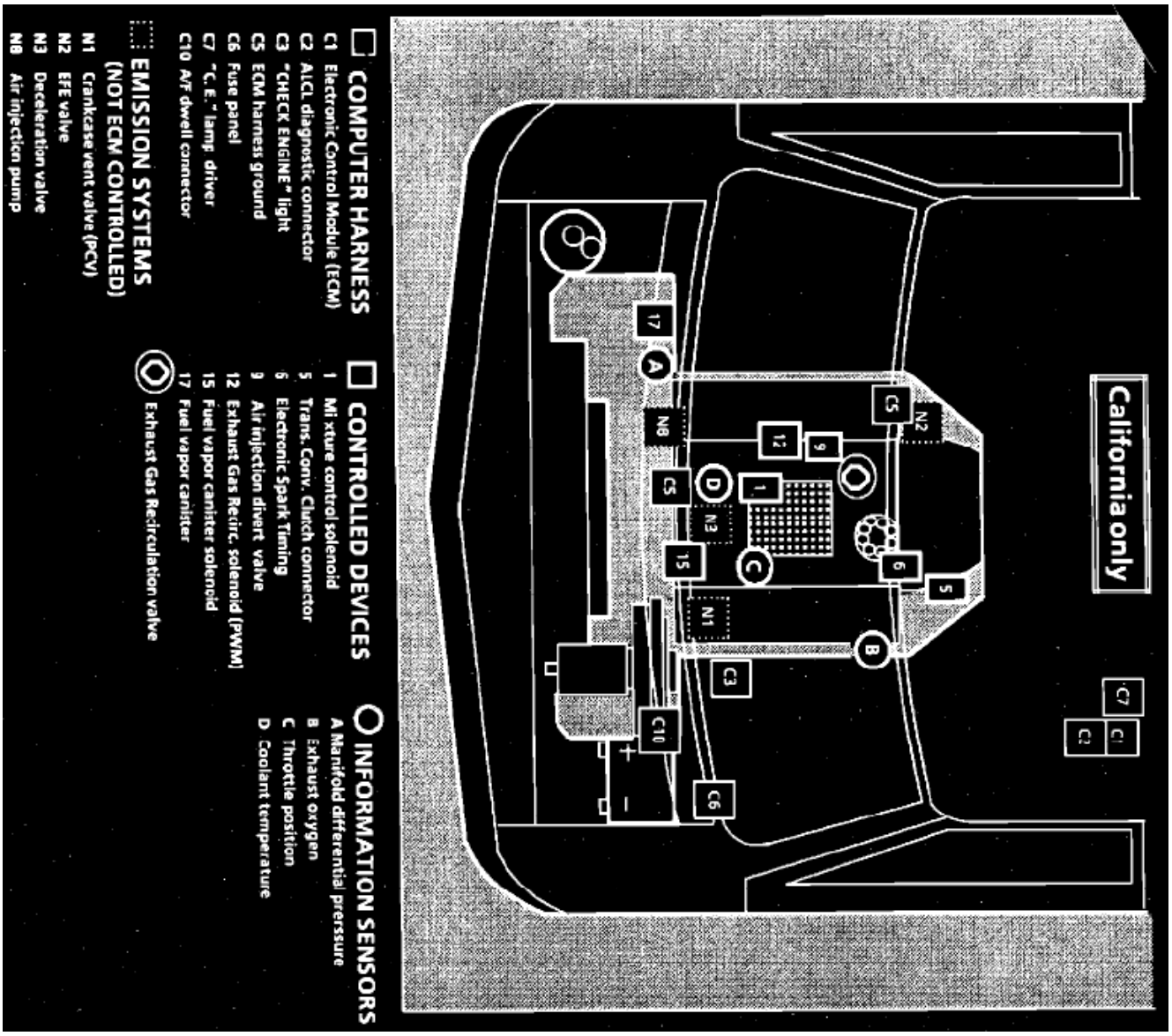


Manifold Pressure/Vacuum Sensor: Locations Manifold Absolute Pressure (MAP) Sensor

Engine Components.

Center Of Dash Panel

Applicable to: 1985 G Series w/V8



Manifold Pressure/Vacuum Sensor: Locations Manifold Differential Pressure Sensor

Underhood & Engine Components.

RH Side Of Dash Panel

Applicable to: 1985 G Series w/5.0L & 5.7L California

Manifold Pressure/Vacuum Sensor: Service and Repair

The MAP and Vacuum sensors are accessible through the engine compartment. The BARO sensor may be located either in the engine compartment or strapped to the ECM harness under the dash panel.

Other than checking for loose hoses and electrical connections, the only service required of these sensors is replacement should diagnosis show any sensors to be faulty.

Oxygen Sensor: Technical Service Bulletins RTV Sealants - Use on Engines With Oxygen Sensors

NUMBER: 86-B-28

GROUP: 6 - Gasoline Engine

DATE: March, 1986

SUBJECT: RTV (AEROBIC SEALANTS) AND ANAEROBIC SEALANTS FOR ENGINES EQUIPPED WITH OXYGEN SENSORS

MODELS: 1981-86 C, K, G, S, T, M, AND CABALLEROS WITH YF5 CALIFORNIA EMISSIONS
1985-86 S, T, AND M WITH 2.5L EFI AND NA

Incorrect usage of RTV sealants (cure in the presence of air) may cause damage to vehicle components such as oxygen sensors. This is caused by silica particles collecting on the oxygen sensor and contaminating the sensor. The correct application for RTV sealants is listed in the WDDGM parts book. The correct RTV sealants to use on engines in GMC Trucks are part numbers 1052914 or 1052917 (black) or part number 1052915 (clear). Red RTV sealant, part number 1052366, is for use on rear axle differential covers only, as it contains silica. Anaerobic sealers (cure without the presence of air) part numbers 1052756, 1052943, and 1052942 are also used to seal the rear main bearing cap to the block on engines used in GMC Trucks. See the chart below for a description of General Motors service approved RTV silicone and anaerobic sealers.

GENERAL MOTORS SERVICE APPROVED RTV SILICONE SEALANTS

Part Name Color Part Number Size Application

GMS (Type B) Black 1052914 300 ml. Caulker All Light

1052917 3 oz. Tube Duty Engines Except 2.5L

GMS (Type A) Clear 1052915 300 ml. Caulker 2.5L 4 Cylinder

GMS Red 1052366 3 oz. Tube Rear Axle Usage Only

GENERAL MOTORS SERVICE APPROVED ANAEROBIC SEALANTS

Part Name Part Number Size Application

Loctite (R) Gasket Maker 1052942 6 ml. Engine Anaerobic Applications

1052943 50 ml.

1052756 6 ml.

Loctite (R) Transmission Case Cover 1052756 6 ml. Transmission Case Covers

Sealant

Loctite (R) Trim Bonding Adhesive 1052621 4 gm. Trim, Super Glue

Loctite (R) Pipe Sealant w/Teflon 1052080 50 ml. Pipe Sealant

Loctite (R) Thread Locking Kit 1052624 10 ml. Thread Locking, Retaining Compound

Loctite (R) Inside Mirror Adhesive Kit 1052369 0.4 cc. Inside Rear View Mirror

GENERAL MOTORS OTHER APPROVED SEALANTS

Part Name Part Number Application

Gasket Sealing Compound 1050026 Gasket Sealing

Adhesive Caulking Kit 9636067 Windshield, Back Glass, Anywhere Urethane Based Sealer Is Required

Oxygen Sensor: Technical Service Bulletins Oxygen Sensors - Silica Contamination

Model Year: 1981

Bulletin No: 81-I-37

File In Group: 60

Number: 11

Date: Feb. 81

Subject: Silica Contamination of Oxygen Sensors and Gelation of Oil.

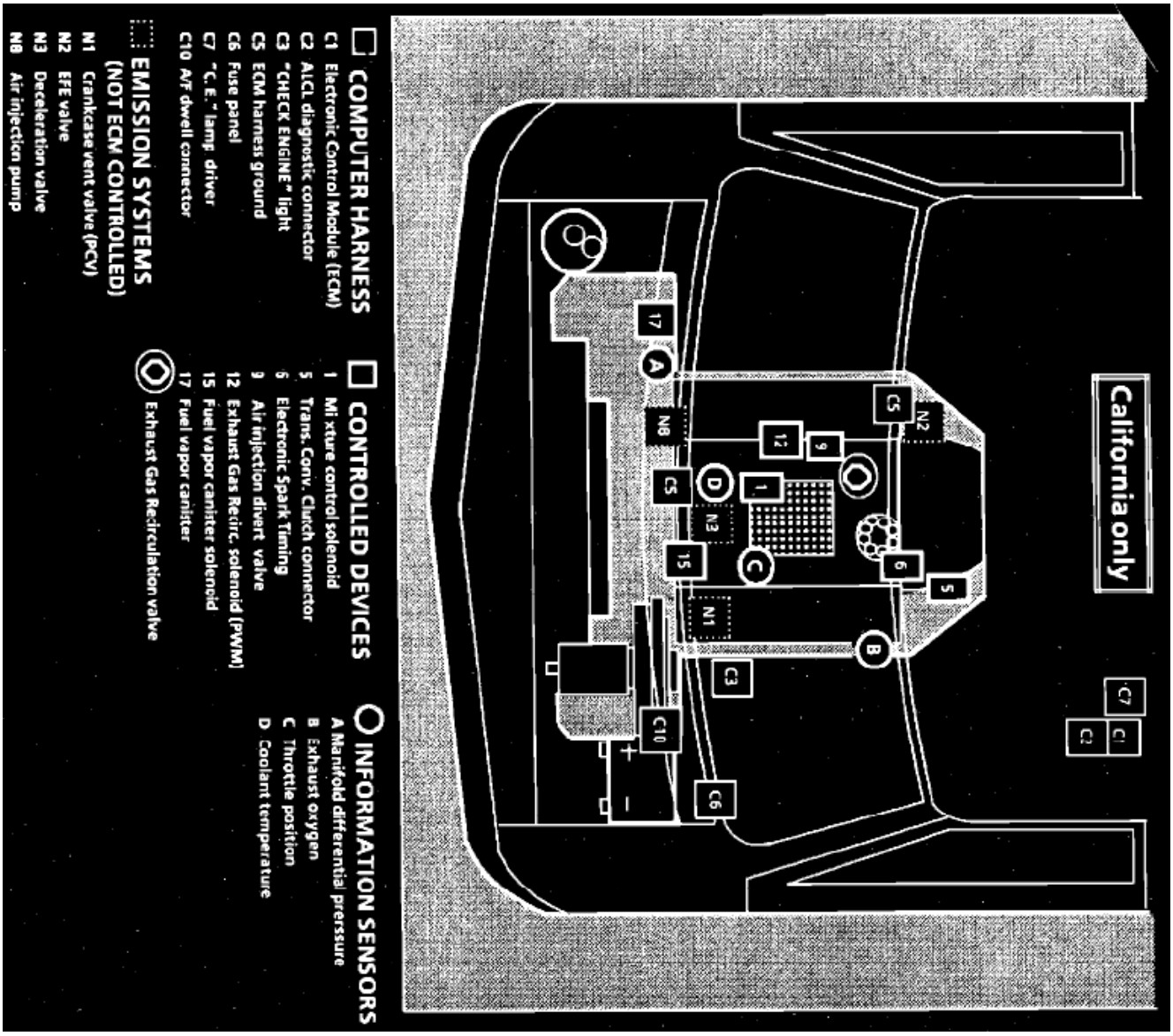
Models Affected: All

Oxygen sensor performance can deteriorate if certain RTV silicone gasket materials are used. Other RTV's when used with certain oils, may cause gelation of the oil. The degree of performance severity depends on the type of RTV and application of the engine involved.

Therefore, when repairing engines where this item is involved, it is important to use either cork composition gaskets or RTV silicone gasket material approved for such use. GMS (General Motors Sealant) or equivalent material can be used. GMS is available through GMPD with the following part numbers:

1052366 3 oz.

1052434 10.14 oz.

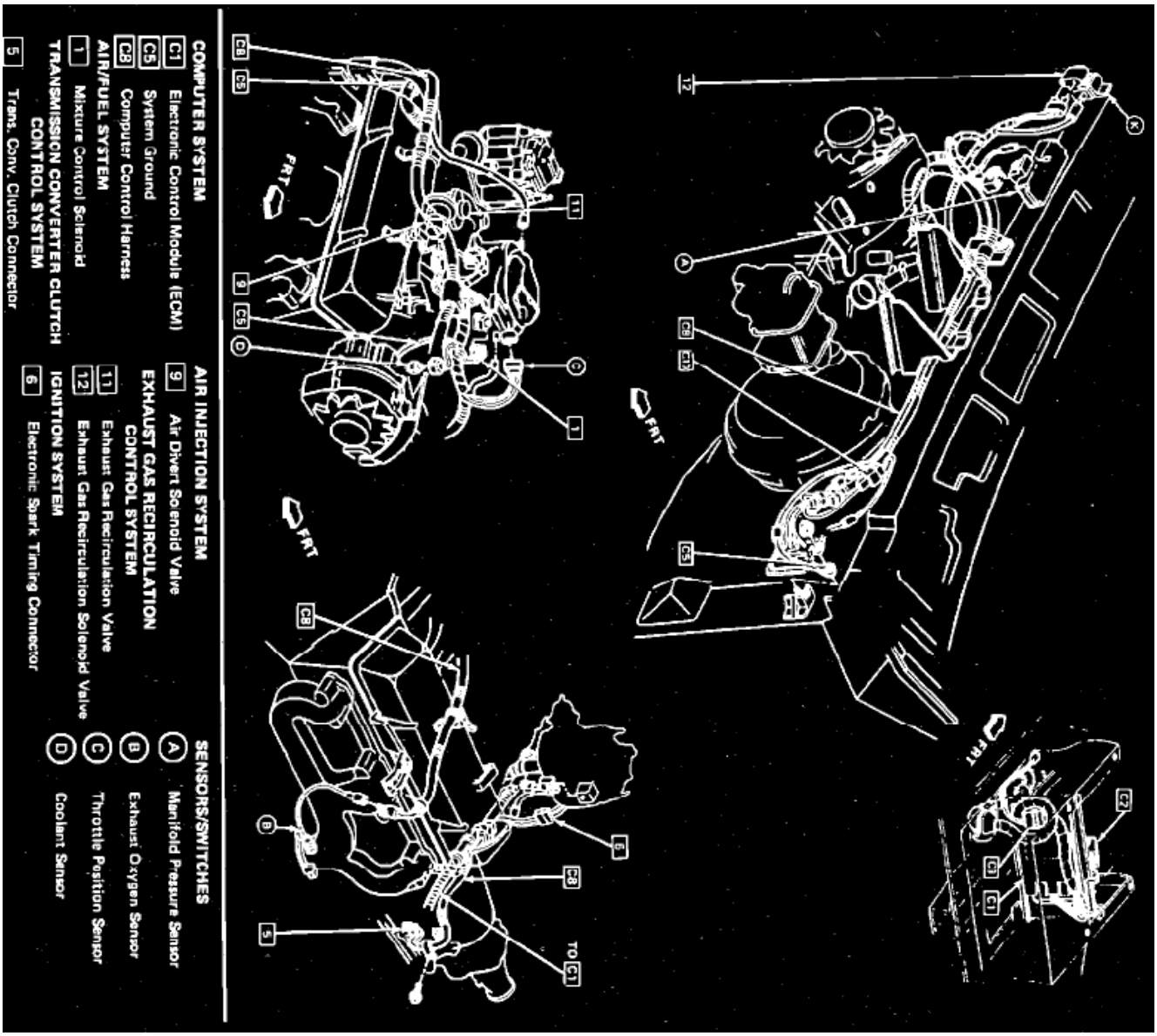


Oxygen Sensor: Locations California

Underhood & Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Oxygen Sensor: Locations Except California

Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

Oxygen Sensor: Description and Operation

The exhaust oxygen sensor is located in the exhaust system and monitors oxygen content in the exhaust gas stream. Varying concentration of oxygen in the exhaust gas causes the O2 sensor to produce a varying voltage output. By monitoring the O2 sensor output voltage, the ECM can determine the amount of oxygen in the exhaust gas and adjust the air/fuel mixture accordingly.

Rich air/fuel ratio = low oxygen content and high signal output (0.45-1.0 volt) Lean air/fuel ratio = high oxygen content and low signal output (below 0.45 volt).

Oxygen Sensor: Service and Repair

The oxygen sensor has a permanently attached pig-tail and connector. This pig-tail should not be removed, since removal will affect proper operation of oxygen sensor.

1. Disconnect electrical connector from oxygen sensor.

2. Using a suitable wrench, carefully remove sensor from exhaust manifold or pipe. The oxygen sensor may be difficult to remove when engine temperature is below 120°F. Use caution, since excessive force may damage threads in exhaust manifold or pipe.

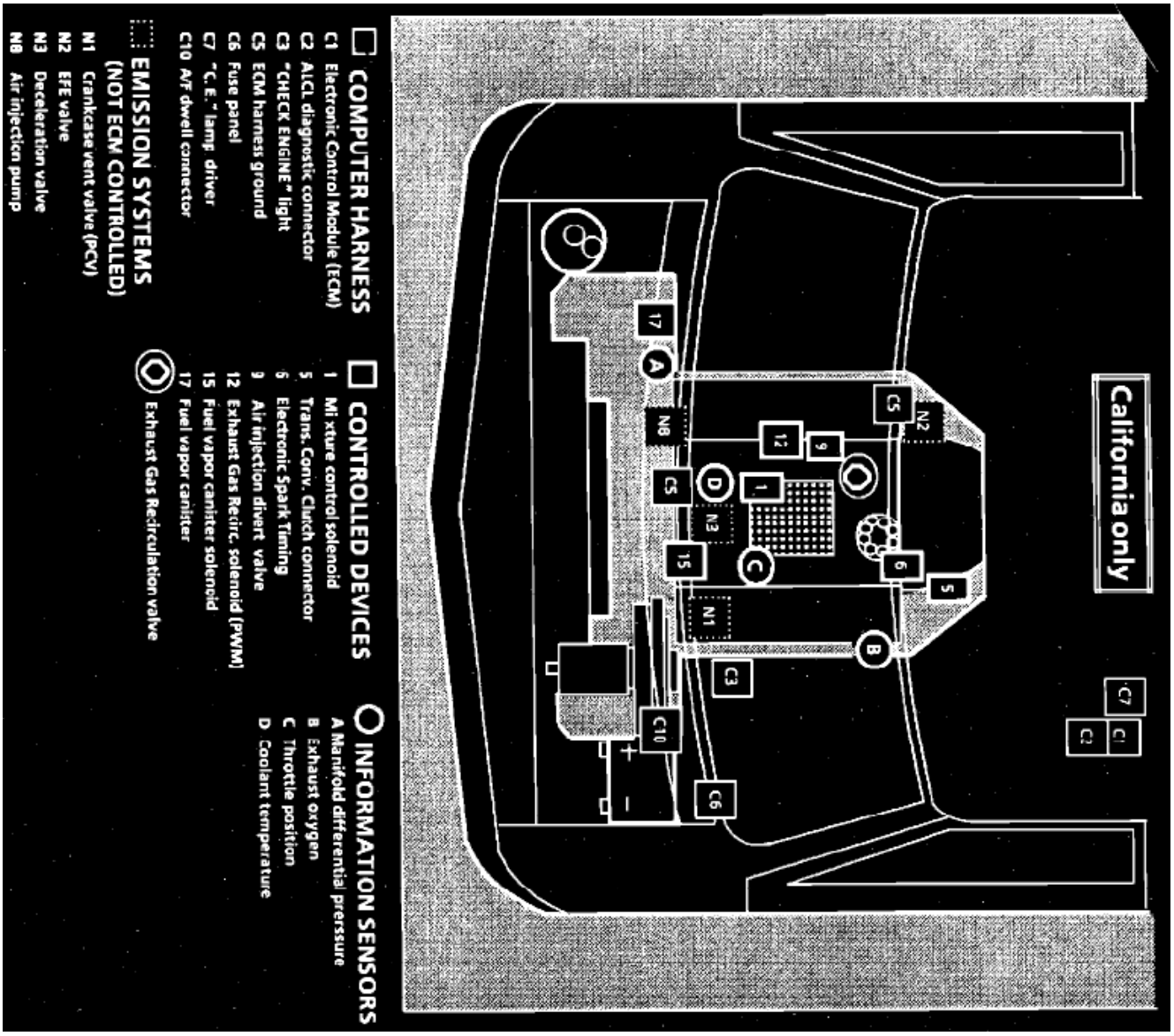
3. If new sensor is being used, install sensor into manifold or pipe.

4. If old sensor is being reused, coat threads with anti-seize compound, Part No. 5613695 or equivalent, then install into manifold or pipe.

5. Torque oxygen sensor to 30 ft. lbs., then reconnect electrical connector.

Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Fig. 16 Throttle Position Sensor Specifications

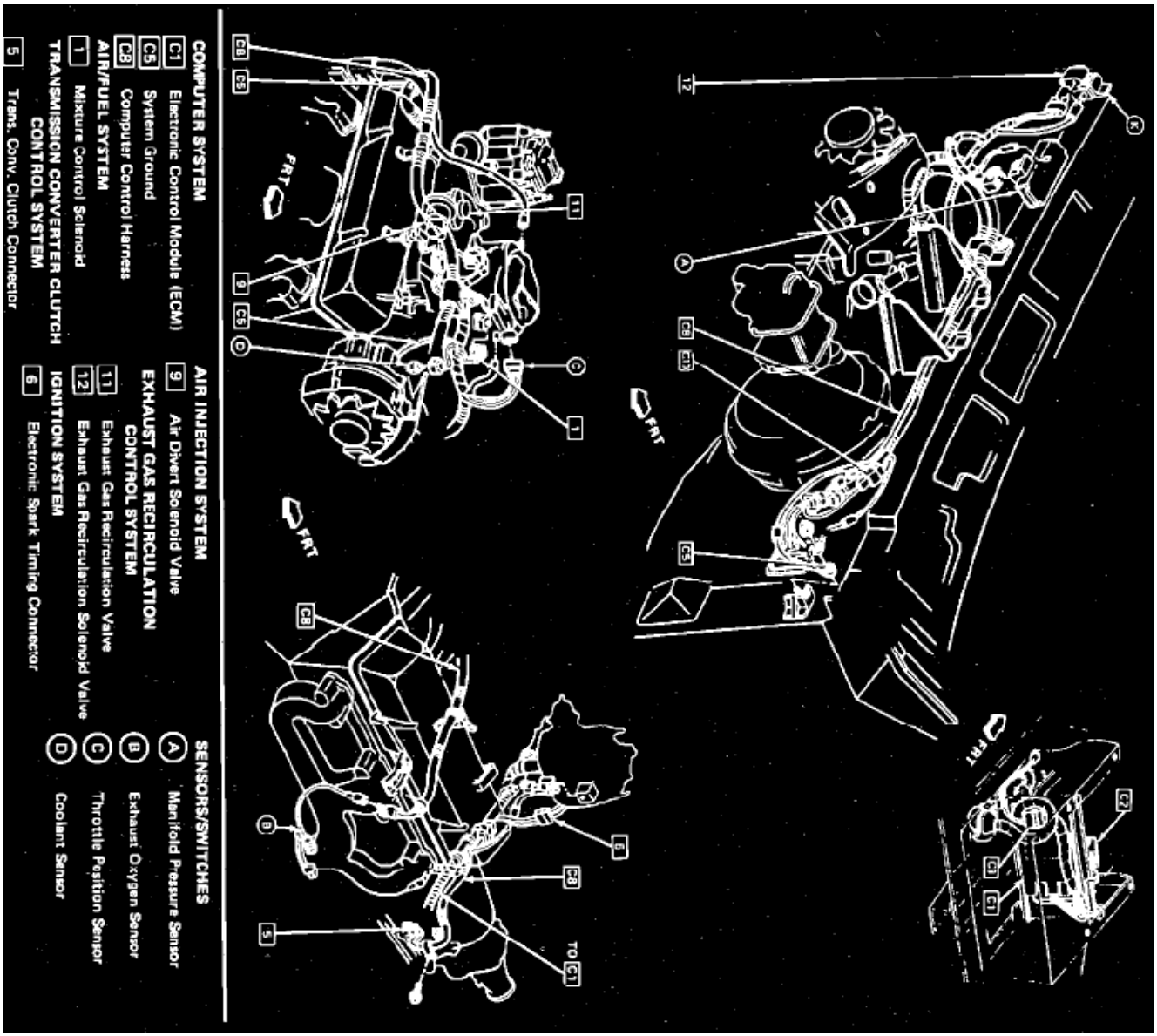


Throttle Position Sensor: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Throttle Position Sensor: Locations Except California

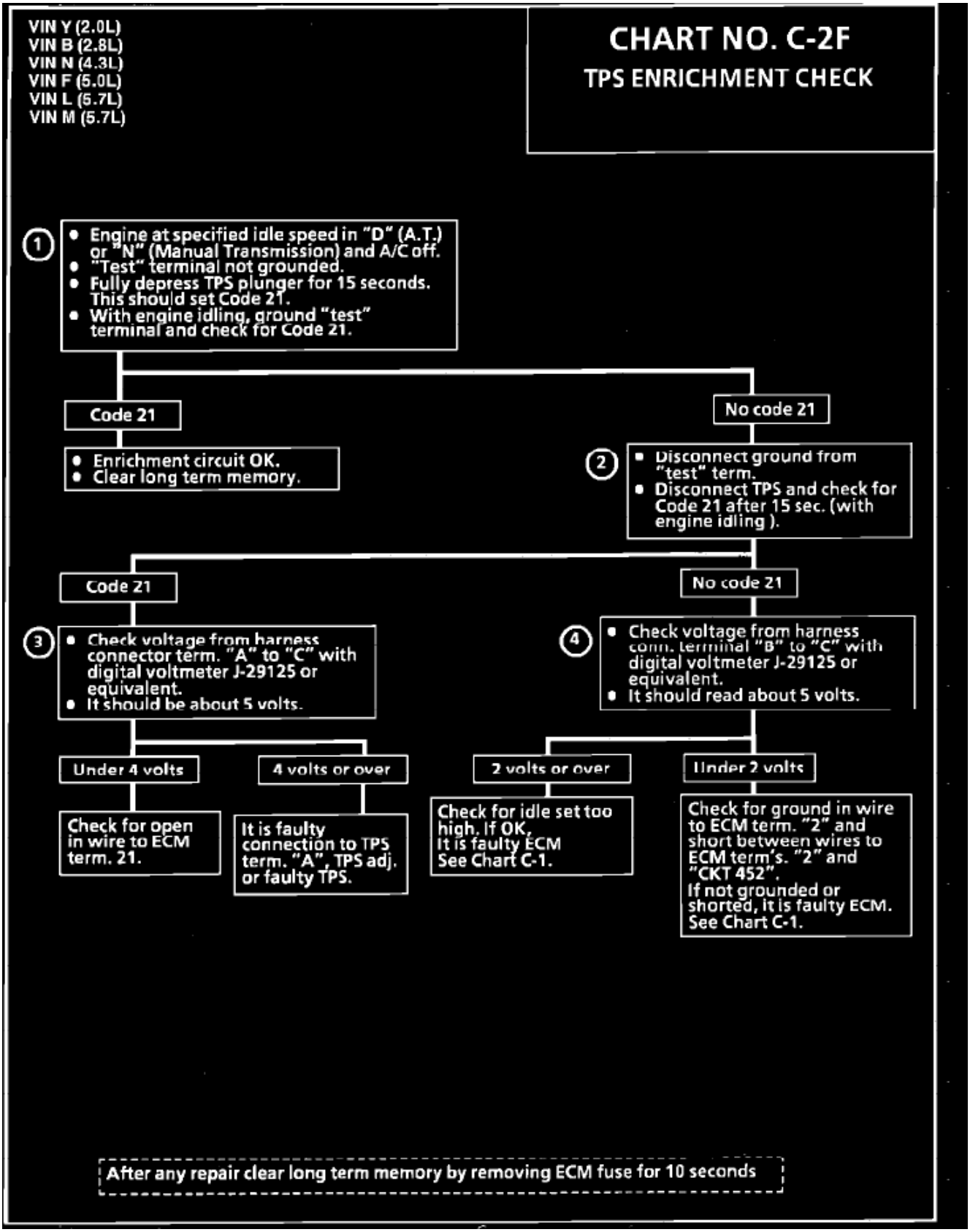
Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

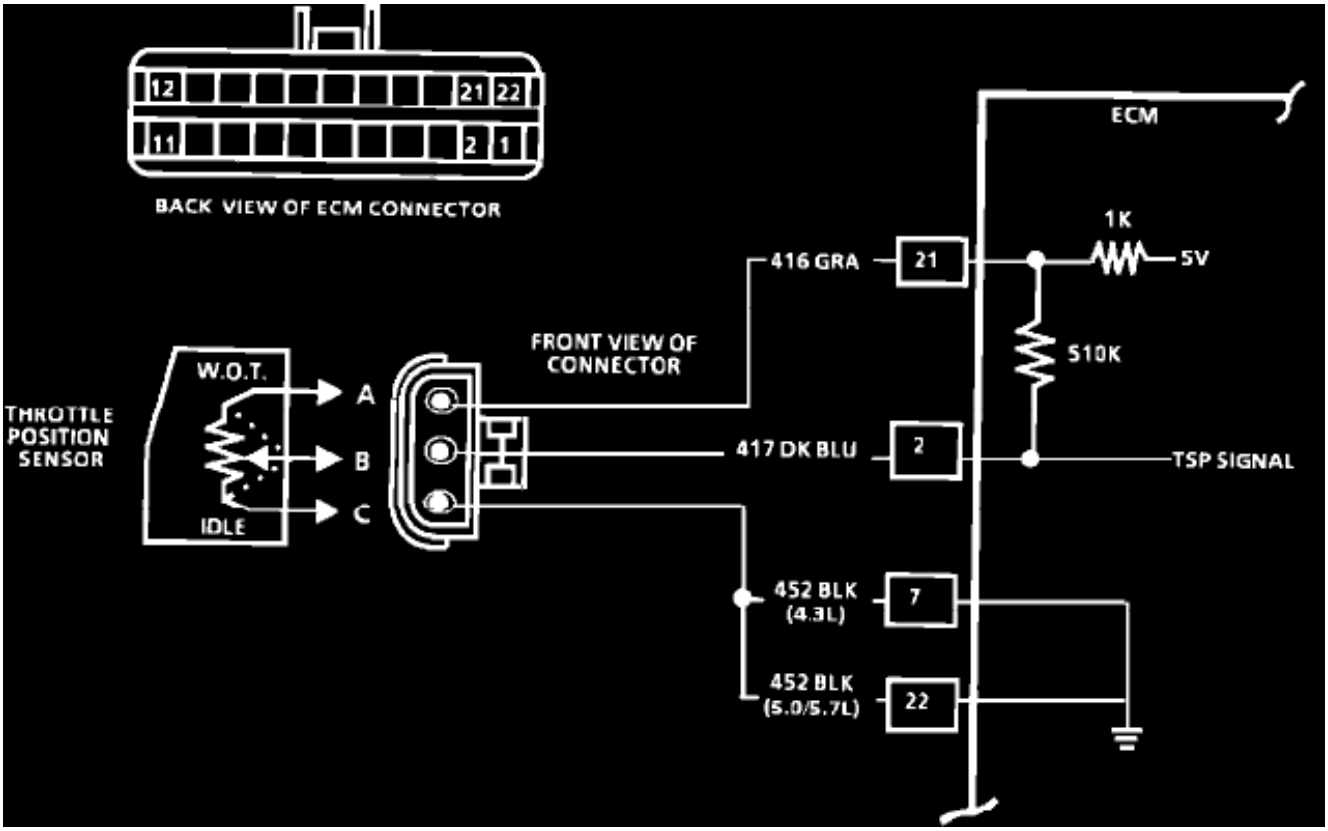
Throttle Position Sensor: Description and Operation

The TPS is mounted in the carburetor body and is moved by the accelerator pump linkage. When the throttle blades are closed, the TPS provides a low voltage (under 1 volt). This voltage signal will increase to up to 5 volts as the throttle blades are opened to wide open throttle. These voltage signals provide an indication of throttle position to the ECM.


VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART NO. C-2F
TPS ENRICHMENT CHECK
1
Engine at specified idle speed in "D" (A.T.) or "N" (Manual Transmission) and A/C off.
"Test" terminal not grounded.
Fully depress TPS plunger for 15 seconds. This should set Code 21.
With engine idling, ground "test" terminal and check for Code 21.
Code 21
Enrichment circuit OK.
Clear long term memory.
No code 21
2
Disconnect ground from "test" term.
Disconnect TPS and check for Code 21 after 15 sec. (with engine idling).
Code 21
3
Check voltage from harness connector term. "A" to "C" with digital voltmeter J-29125 or equivalent.
It should be about 5 volts.
Under 4 volts
Check for open in wire to ECM term. 21.
4 volts or over
It is faulty connection to TPS term. "A", TPS adj. or faulty TPS.
No code 21
4
Check voltage from harness conn. terminal "B" to "C" with digital voltmeter J-29125 or equivalent.
It should read about 5 volts.
2 volts or over
Check for idle set too high. If OK, It is faulty ECM See Chart C-1.
Under 2 volts
Check for ground in wire to ECM term. "2" and short between wires to ECM term's. "2" and "CKT 452". If not grounded or shorted, it is faulty ECM. See Chart C-1.
After any repair clear long term memory by removing ECM fuse for 10 seconds

Throttle Position Sensor: Testing and Inspection

Chart C-2F - TPS Enrichment Check



Wiring Diagram for Chart C-2F - TPS Enrichment Check

CHART C-2F - TPS ENRICHMENT CHECK

Test Description:

1. This step checks that the TPS will cause an ECM "Rich" command when fully depressed manually. On some vehicles, this will cause a low dwell (full rich). On others it will not.

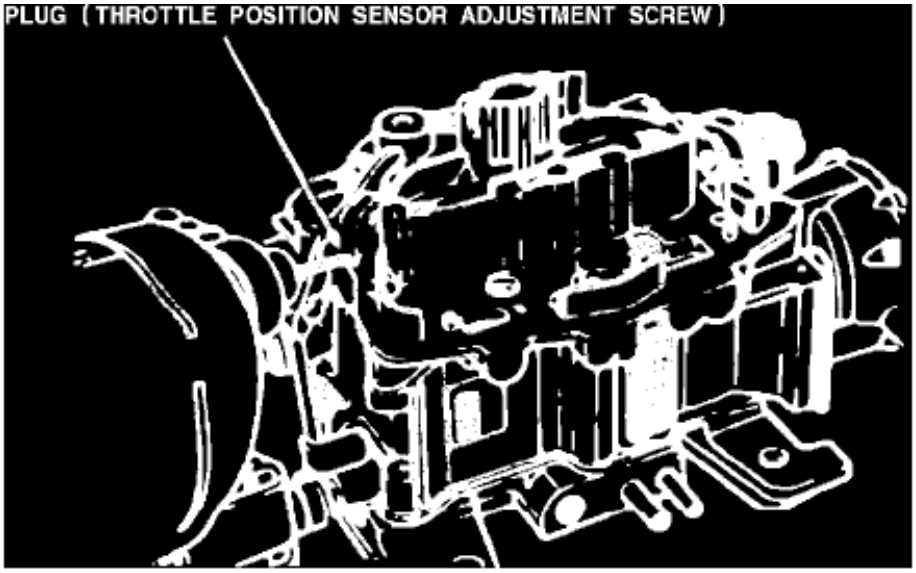
Code 21 should normally be set.

2. This step distinguishes between a faulty TPS or ECM harness/ECM.

Code 21 should normally be set, if engine RPM is not set above specifications.

3. This step checks for 5V. ref. at TPS. It should be about 5 volts. If loss of V. Ref were in the ECM, it should set Codes 21, 32 and 34 since this is the same 5V to VAC Sensor. Therefore, it must be an open in the wire.

4. This step checks for a grounded circuit. Normal circuit should read about 5 volts. Checking for grounded TPS output to Terminal "2" of ECM, or short in CKT 417 and 452 from TPS, indicates whether fault is in wiring or ECM. A voltmeter with a 10 megohms resistance must be used for an accurate reading.



Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.20	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Throttle Position Sensor: Adjustments

Fig. 15 Throttle Position Sensor Adjustment Screw Cover Removal

Fig. 16 Throttle Position Sensor Specifications

Do not remove plug sealing TPS adjustment or adjust TPS unless carburetor is overhauled or ``Computer Command Control (C3)'' system

diagnosis indicates a problem with the switch.

1. Drill a .078 (5/64) inch hole, 1/16-1/8 inch deep, in plug covering TPS adjustment, Fig. 15.

2. Thread a No. 8 sheet metal screw into hole and pry out plug using a suitable lever.

3. Remove TPS adjusting screw using tool J-28696 or equivalent.

4. Leaving electrical connector in place, connect a digital voltmeter between TPS center terminal (B) and bottom terminal (C), using jumper wires if necessary. Only a digital voltmeter with 10 megohm input impedance or higher can be used. Conventional voltmeters do not have sufficient resistance to obtain accurate readings.

5. With ignition on, engine stopped and A/C off, install TPS screw and adjust quickly to obtain specified TPS idle voltage, Fig. 16.

6. Turn ignition off and install new plug over TPS adjusting screw or seal opening with RTV sealer.

Throttle Position Sensor: Service and Repair

To replace Throttle Position Sensor it is necessary to remove the air horn assembly from the carburetor.

1. Remove or disconnect electrical connectors from M/C solenoid and TPS assembly.

2. Air horn removal:

a. Remove upper choke lever from end of choke shaft by removing attaching screw. Rotate upper choke lever to remove lever from choke link.

b. Remove choke link from lower lever inside the float bowl casting. Remove link by holding lower lever outward with small screwdriver and twisting link counter-clockwise.

c. Remove the retainer from the pump link, and remove link from lever. DO NOT remove pump lever from air horn.

d. Remove vacuum break hose from tube on float bowl.

e. Remove air horn-to-bowl screws; then remove the two countersunk attaching screws located next to the venturi.

f. Remove air horn from bowl by lifting it straight up. (Gasket should remain on float bowl).

3. Remove solenoid-metering rod plunger by lifting straight up.

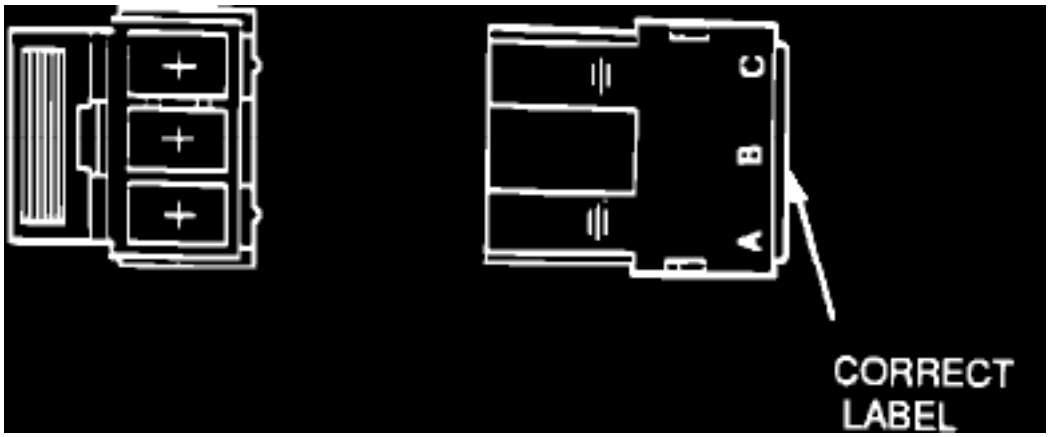
4. Remove air horn gasket by lifting it from the bowl locating pins on the float bowl. DISREGARD GASKET.

5. Remove float bowl insert.

6. Remove metering rods and springs.

7. Remove throttle position sensor by pushing up from bottom of electrical connector and remove TPS and connector assembly from bowl.

8. Reverse procedure to install new TPS sensor using new air horn gasket.



Vehicle Speed Sensor: Technical Service Bulletins Electrical - VSS Connector Mislabeled

GMC NUMBER: 88-T-145

GROUP: 6D-Engine Electrical

DATE: August, 1988

CORPORATE NUMBER:

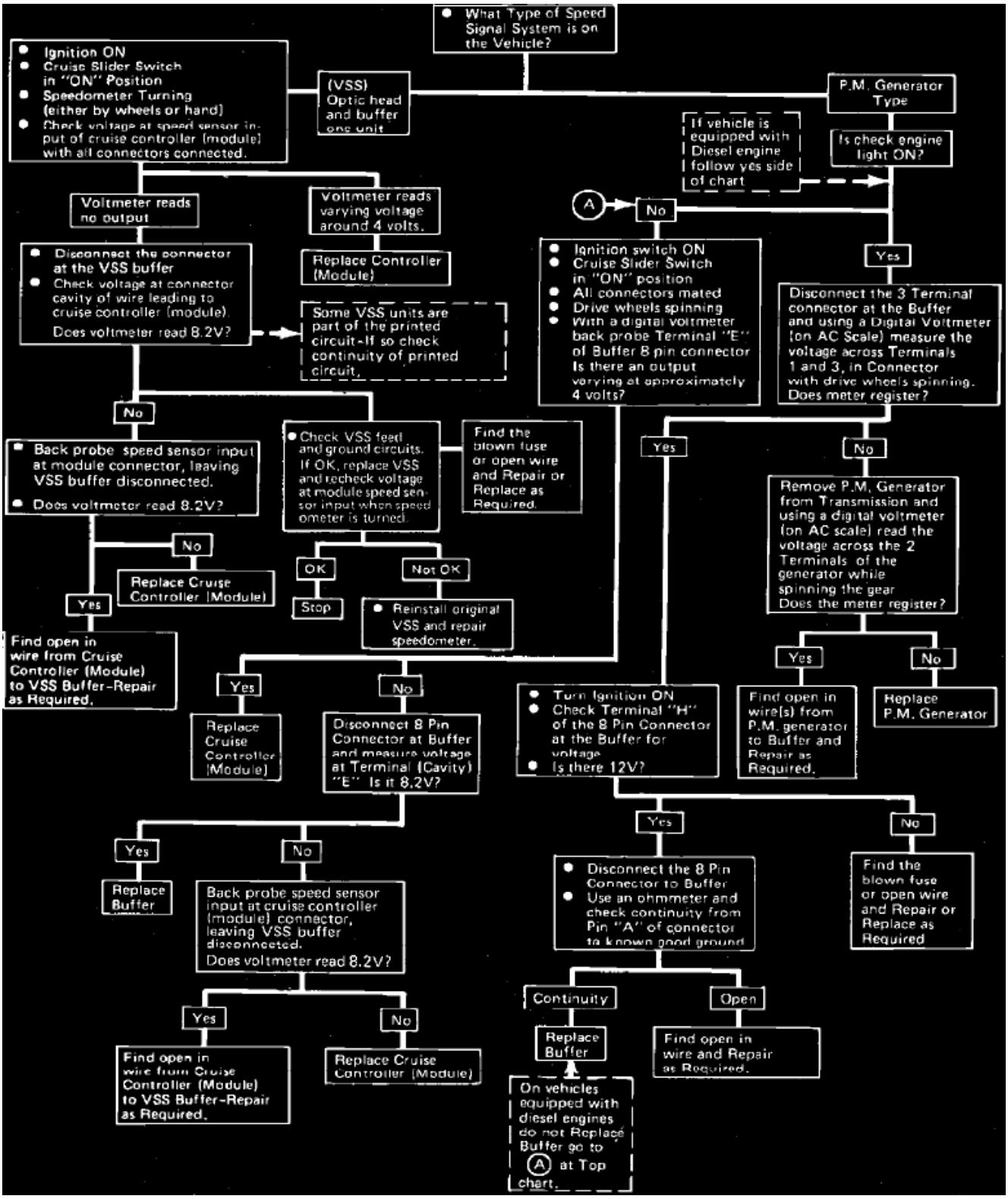
818107

SUBJECT: CONNECTOR MISLABELED

MODELS: 1985-88 G, S, R, AND M VEHICLES

FIGURE NO. 1VEHICLE SPEED SENSOR BUFFER CORRECT CONNECTOR LABEL

Some 1985-88 vehicles may have an electrical connector at the vehicle speed sensor (VSS), which is improperly labeled. The connector will work properly but could cause confusion if electrical troubleshooting is necessary. Figure No. 1 shows a properly labeled connector. The improperly labeled connectors have the "A" and "C" reversed. All Service Manual terminal call-outs use the labeling as shown in Figure No. 1.



Vehicle Speed Sensor: Testing and Inspection

Fig. 17 Speed Sensor System Test (Custom Cruise III)

Refer to Fig. 17 to check speed sensor and related wiring.

Vehicle Speed Sensor: Service and Repair

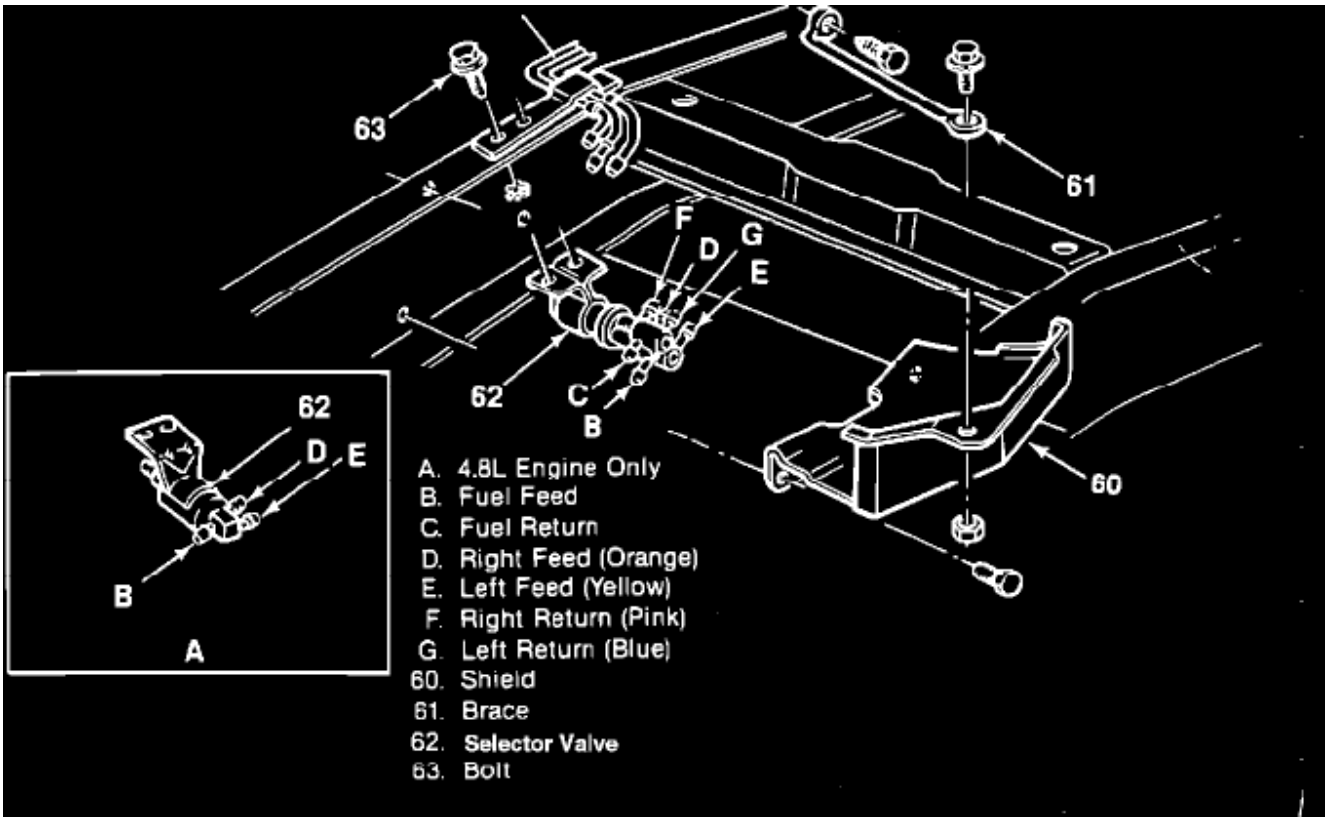
The Vehicle Speed Sensor is located behind the speedometer cluster. To replace sensor proceed as follows:

1. Remove speedometer cluster to gain access to sensor.

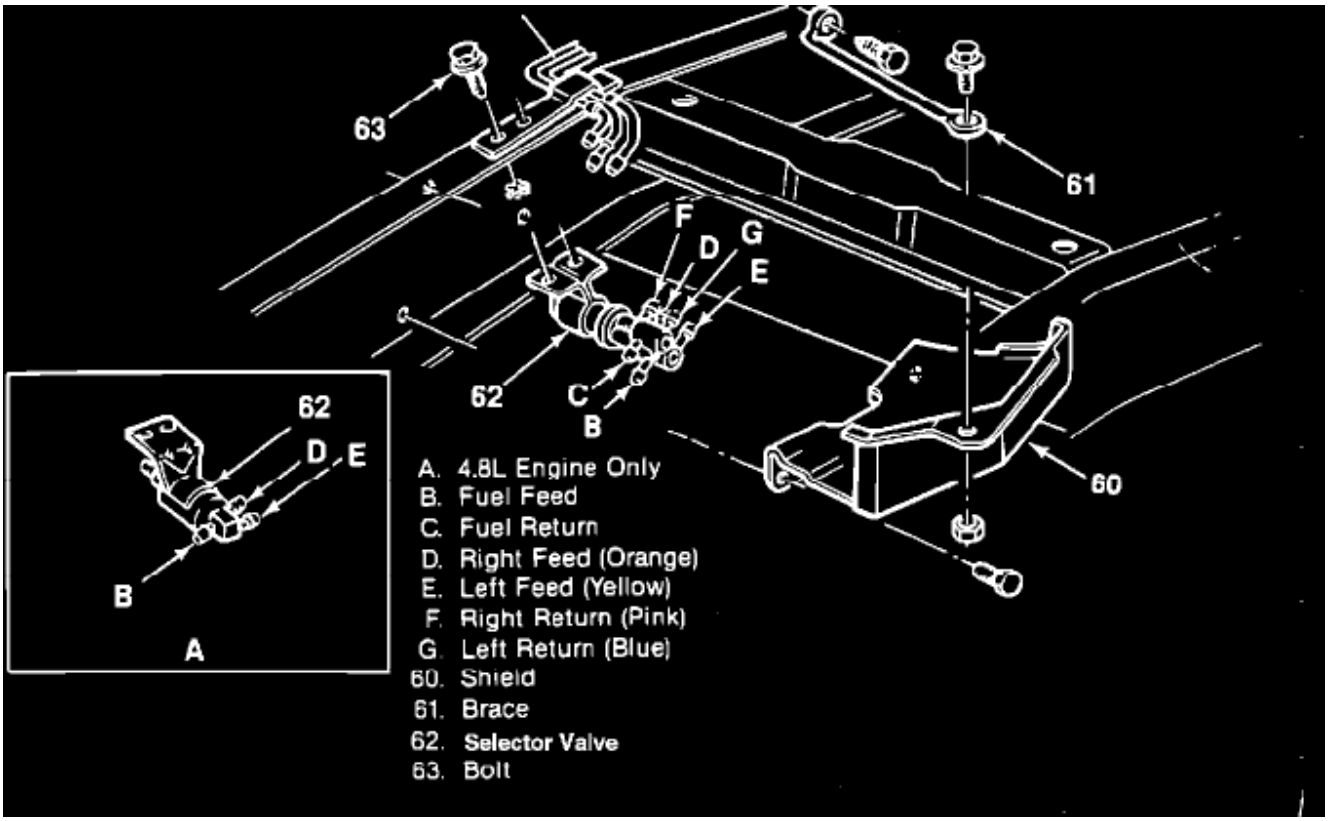
2. Disconnect sensor electrical connectors.

3. Remove sensor retaining screw and the sensor.

4. Reverse procedure to install.



Auxiliary Fuel Selector Valve

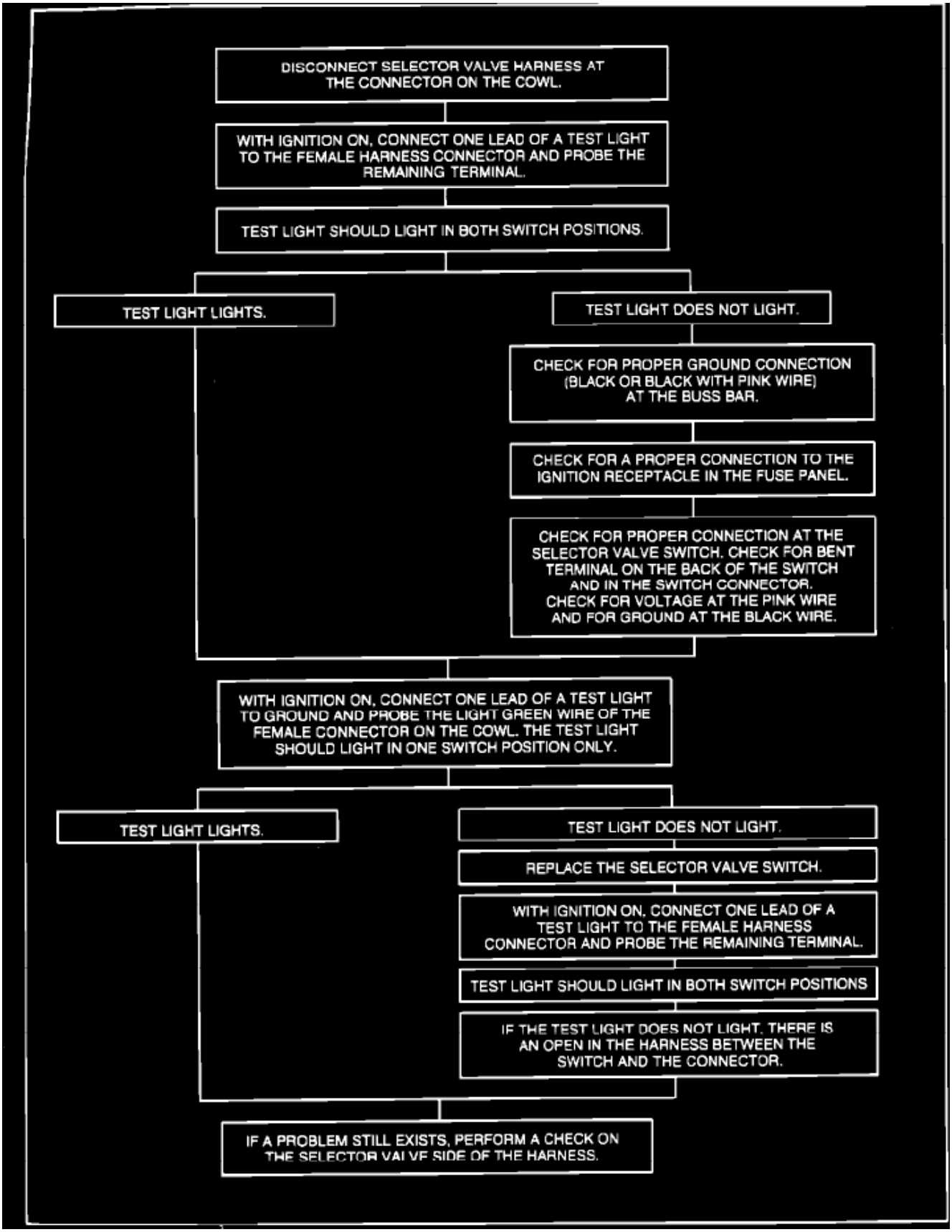


Auxiliary Fuel Tank Control: Description and Operation

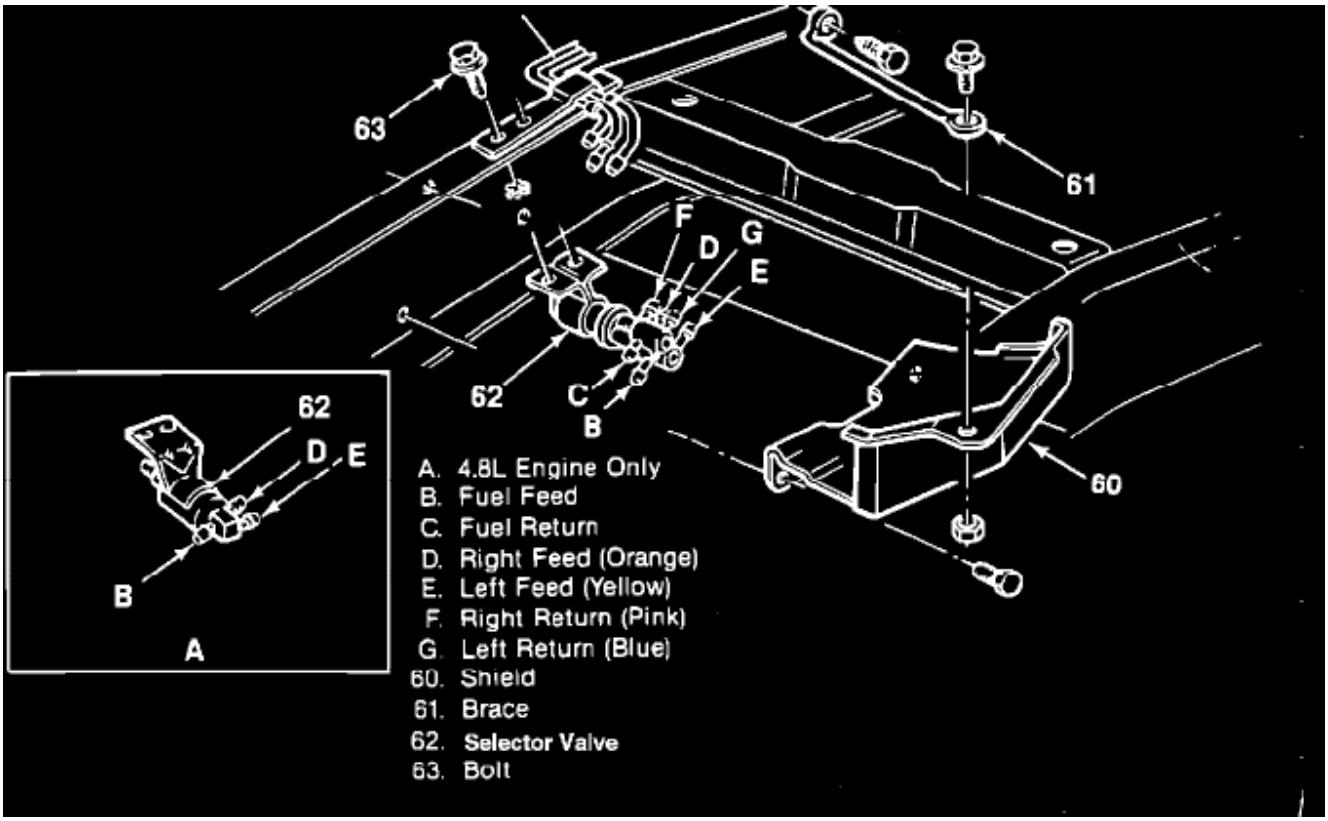
Auxiliary Fuel Selector Valve

NOTE: This information applies only to vehicles equipped with auxiliary fuel tank option.

An auxiliary fuel tank switching valve, controlled by an electrical switch, allows selection of either the primary fuel tank or auxiliary fuel tank.



Auxiliary Fuel Tank Selector Diagnostic Chart



Auxiliary Fuel Tank Control: Service and Repair

Auxiliary Fuel Selector Valve

WARNING: To reduce the risk of personal injury when disconnecting the fuel hoses and lines, cover the fuel hoses and lines with a shop cloth to collect the fuel, and then place the cloth into an approved container.

REMOVAL:

The auxiliary fuel tank control valve is located under the right hand side, center of vehicle, attached to the inner side of the frame.

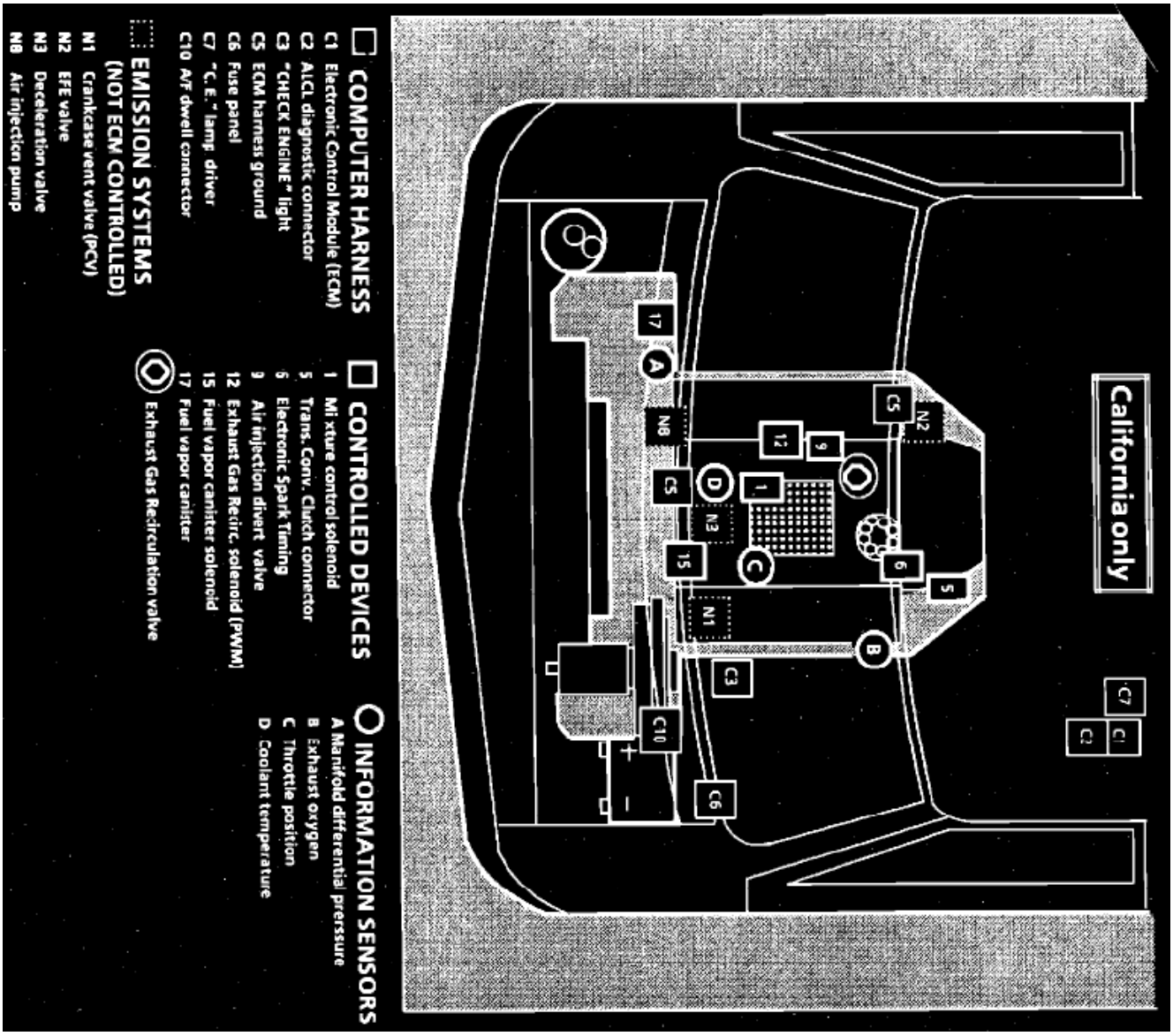
1. Disconnect negative battery cable from vehicle battery. 2. Raise vehicle. 3. Remove hose shield, when required. 4. Remove electrical connector from valve and switch assembly. 5. Remove fuel feed and return hoses. Note position and color markings on hoses. 6. Remove selector valve and meter switch from frame.

INSTALLATION:

1. Install the selector valve and meter switch to the frame. 2. Connect the fuel feed and return hoses, taking care to install hoses in the correct positions. 3. Connect electrical connector to valve and switch assembly. 4. Install hose shield, when required. 5. Lower vehicle. 6. Reconnect negative battery cable to vehicle battery. 7. START vehicle and allow to run while checking for fuel leaks.

Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Fig. 16 Throttle Position Sensor Specifications

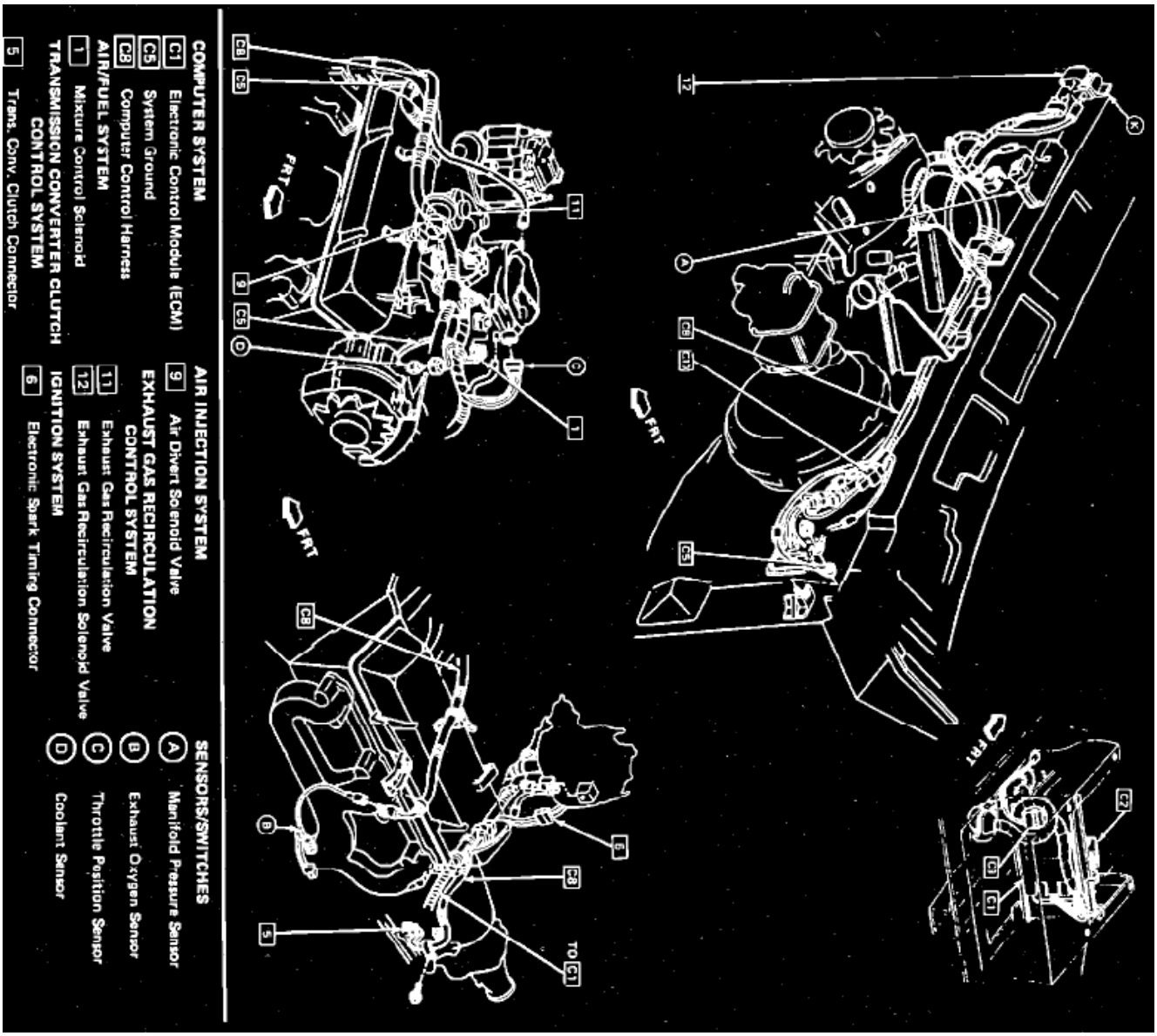


Throttle Position Sensor: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Throttle Position Sensor: Locations Except California

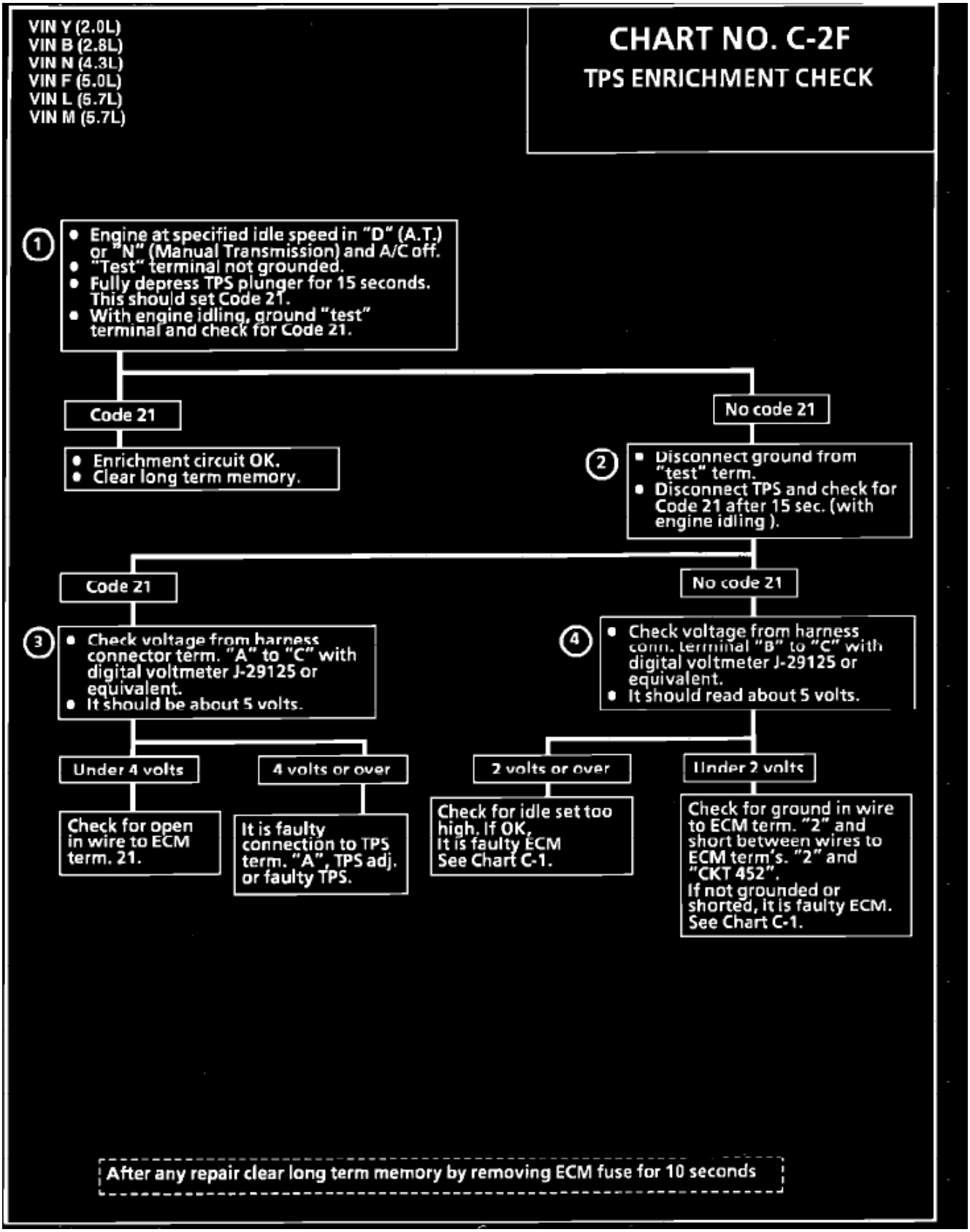
Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

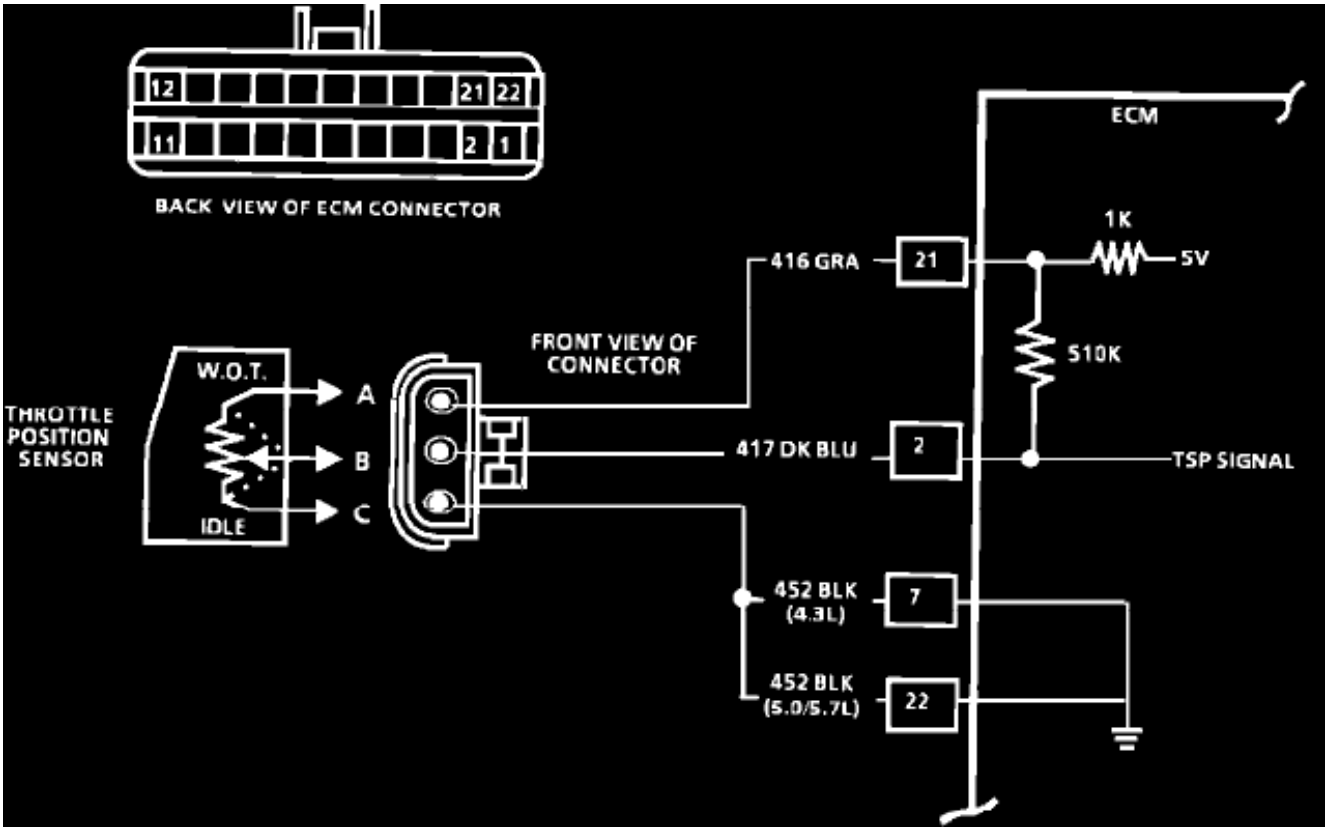
Throttle Position Sensor: Description and Operation

The TPS is mounted in the carburetor body and is moved by the accelerator pump linkage. When the throttle blades are closed, the TPS provides a low voltage (under 1 volt). This voltage signal will increase to up to 5 volts as the throttle blades are opened to wide open throttle. These voltage signals provide an indication of throttle position to the ECM.


VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART NO. C-2F
TPS ENRICHMENT CHECK
1
Engine at specified idle speed in "D" (A.T.) or "N" (Manual Transmission) and A/C off.
"Test" terminal not grounded.
Fully depress TPS plunger for 15 seconds. This should set Code 21.
With engine idling, ground "test" terminal and check for Code 21.
Code 21
Enrichment circuit OK.
Clear long term memory.
No code 21
2
Disconnect ground from "test" term.
Disconnect TPS and check for Code 21 after 15 sec. (with engine idling).
Code 21
3
Check voltage from harness connector term. "A" to "C" with digital voltmeter J-29125 or equivalent.
It should be about 5 volts.
Under 4 volts
Check for open in wire to ECM term. 21.
4 volts or over
It is faulty connection to TPS term. "A", TPS adj. or faulty TPS.
No code 21
4
Check voltage from harness conn. terminal "B" to "C" with digital voltmeter J-29125 or equivalent.
It should read about 5 volts.
2 volts or over
Check for idle set too high. If OK, It is faulty ECM See Chart C-1.
Under 2 volts
Check for ground in wire to ECM term. "2" and short between wires to ECM term's. "2" and "CKT 452". If not grounded or shorted, it is faulty ECM. See Chart C-1.
After any repair clear long term memory by removing ECM fuse for 10 seconds

Throttle Position Sensor: Testing and Inspection

Chart C-2F - TPS Enrichment Check



Wiring Diagram for Chart C-2F - TPS Enrichment Check

CHART C-2F - TPS ENRICHMENT CHECK

Test Description:

1. This step checks that the TPS will cause an ECM "Rich" command when fully depressed manually. On some vehicles, this will cause a low dwell (full rich). On others it will not.

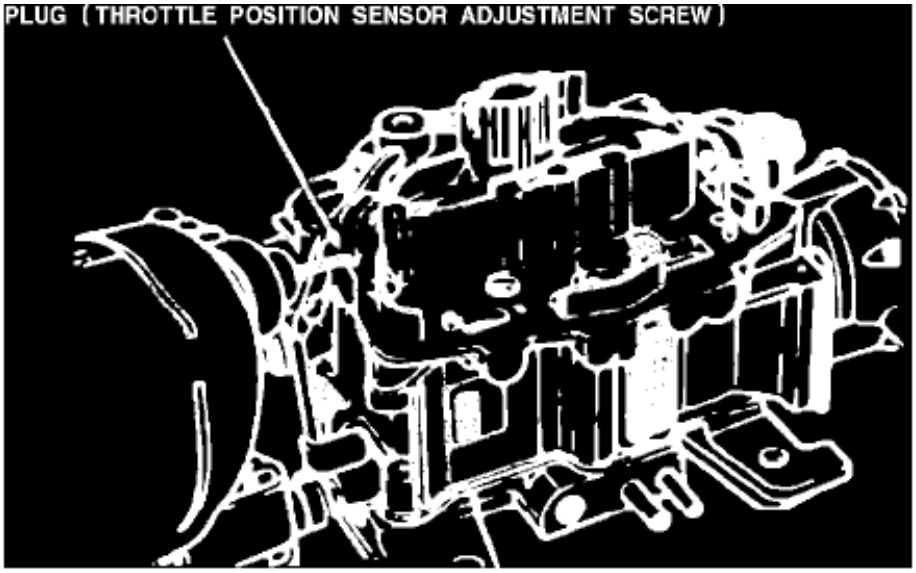
Code 21 should normally be set.

2. This step distinguishes between a faulty TPS or ECM harness/ECM.

Code 21 should normally be set, if engine RPM is not set above specifications.

3. This step checks for 5V. ref. at TPS. It should be about 5 volts. If loss of V. Ref were in the ECM, it should set Codes 21, 32 and 34 since this is the same 5V to VAC Sensor. Therefore, it must be an open in the wire.

4. This step checks for a grounded circuit. Normal circuit should read about 5 volts. Checking for grounded TPS output to Terminal "2" of ECM, or short in CKT 417 and 452 from TPS, indicates whether fault is in wiring or ECM. A voltmeter with a 10 megohms resistance must be used for an accurate reading.



Year	Engine (VIN Code)		Voltage	Throttle Position
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	3.8L	A	.77	Curb Idle
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1983	2.0L	Y	.20	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
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	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
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	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Throttle Position Sensor: Adjustments

Fig. 15 Throttle Position Sensor Adjustment Screw Cover Removal

Fig. 16 Throttle Position Sensor Specifications

Do not remove plug sealing TPS adjustment or adjust TPS unless carburetor is overhauled or ``Computer Command Control (C3)'' system

diagnosis indicates a problem with the switch.

1. Drill a .078 (5/64) inch hole, 1/16-1/8 inch deep, in plug covering TPS adjustment, Fig. 15.

2. Thread a No. 8 sheet metal screw into hole and pry out plug using a suitable lever.

3. Remove TPS adjusting screw using tool J-28696 or equivalent.

4. Leaving electrical connector in place, connect a digital voltmeter between TPS center terminal (B) and bottom terminal (C), using jumper wires if necessary. Only a digital voltmeter with 10 megohm input impedance or higher can be used. Conventional voltmeters do not have sufficient resistance to obtain accurate readings.

5. With ignition on, engine stopped and A/C off, install TPS screw and adjust quickly to obtain specified TPS idle voltage, Fig. 16.

6. Turn ignition off and install new plug over TPS adjusting screw or seal opening with RTV sealer.

Throttle Position Sensor: Service and Repair

To replace Throttle Position Sensor it is necessary to remove the air horn assembly from the carburetor.

1. Remove or disconnect electrical connectors from M/C solenoid and TPS assembly.

2. Air horn removal:

a. Remove upper choke lever from end of choke shaft by removing attaching screw. Rotate upper choke lever to remove lever from choke link.

b. Remove choke link from lower lever inside the float bowl casting. Remove link by holding lower lever outward with small screwdriver and twisting link counter-clockwise.

c. Remove the retainer from the pump link, and remove link from lever. DO NOT remove pump lever from air horn.

d. Remove vacuum break hose from tube on float bowl.

e. Remove air horn-to-bowl screws; then remove the two countersunk attaching screws located next to the venturi.

f. Remove air horn from bowl by lifting it straight up. (Gasket should remain on float bowl).

3. Remove solenoid-metering rod plunger by lifting straight up.

4. Remove air horn gasket by lifting it from the bowl locating pins on the float bowl. DISREGARD GASKET.

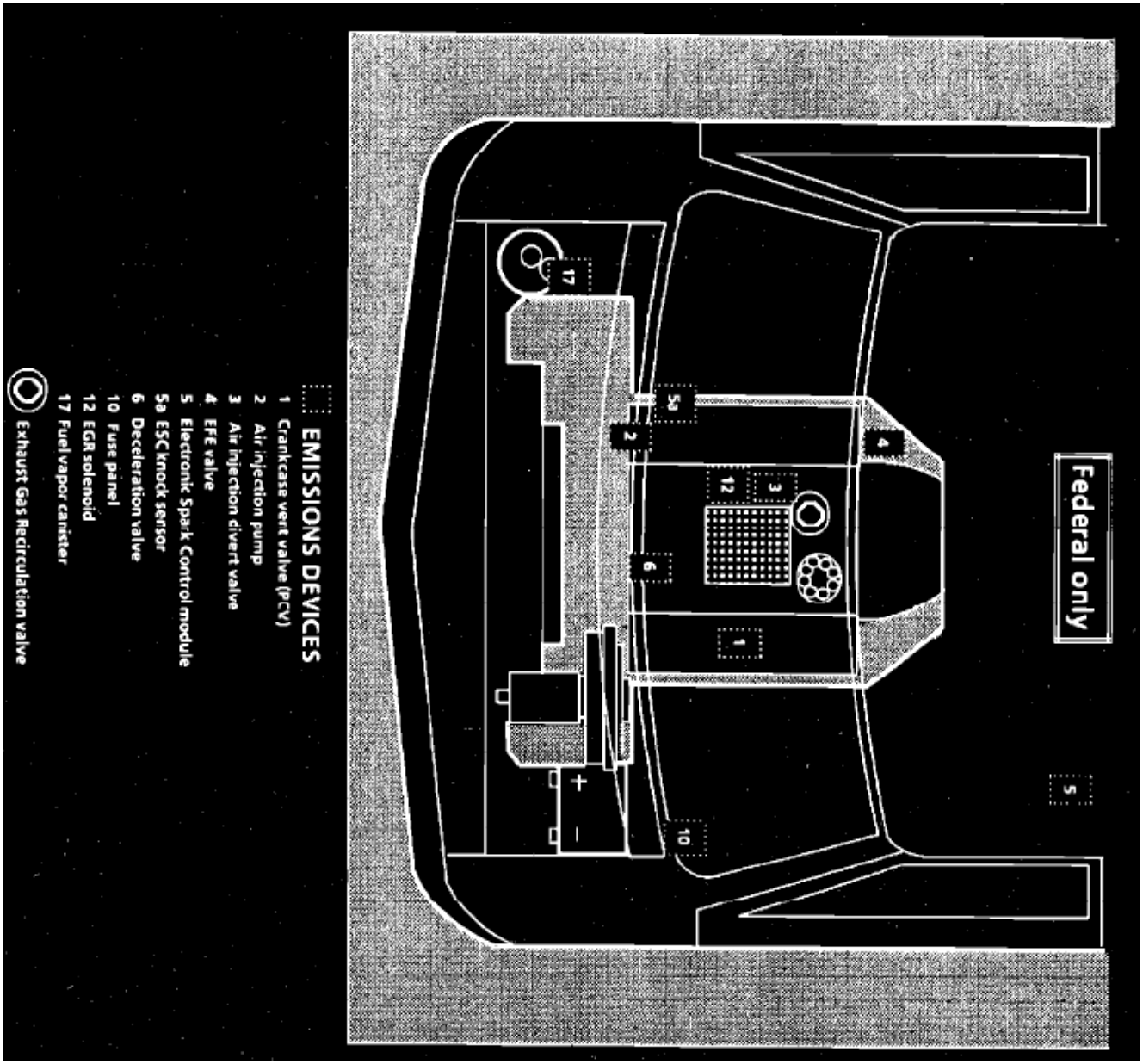
5. Remove float bowl insert.

6. Remove metering rods and springs.

7. Remove throttle position sensor by pushing up from bottom of electrical connector and remove TPS and connector assembly from bowl.

8. Reverse procedure to install new TPS sensor using new air horn gasket.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Sensors and Switches - Powertrain Management > Sensors and Switches - Ignition System > Knock Sensor > Component Information > Locations > Electronic Spark Control Knock Sensor

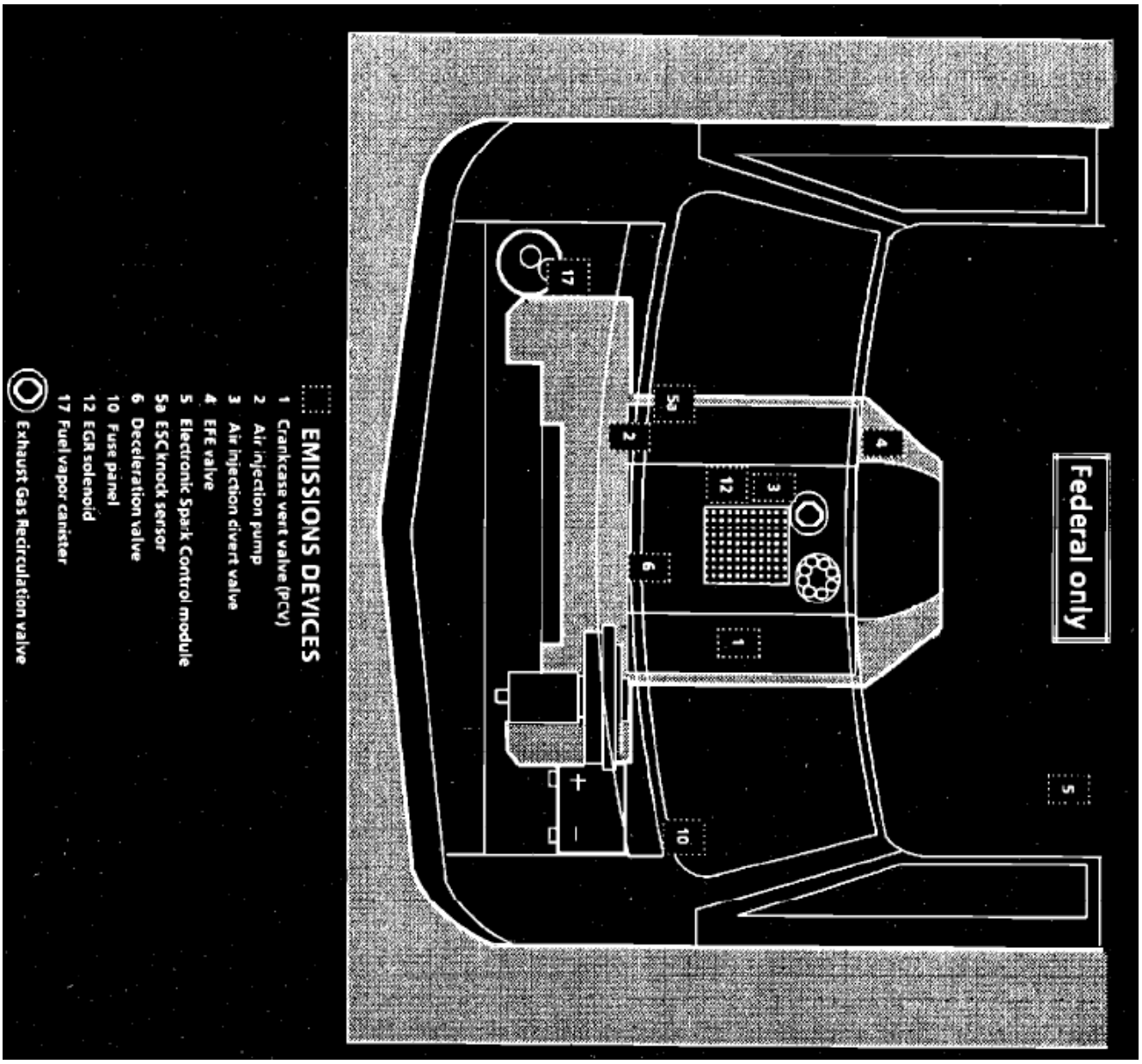


Knock Sensor: Locations Electronic Spark Control Knock Sensor

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Knock Sensor: Locations Electronic Spark Control Module

Underhood & Engine Components.

Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

Fuel Pressure: Specifications

Fuel Pressure .... 27.5 to 44.8 kPa (4 to 6.5 psi) Fuel Pump Vacuum .... 50.6 kPa (15 inches Hg)

Fuel Pressure: Testing and Inspection Fuel Pump Flow Test - Fuel Injected

FUEL PUMP FLOW TEST

1. Disconnect the EFI fuel feed line, then connect suitable hose to line and direct end into suitable container.

2. Apply battery voltage to the fuel pump test terminal. The fuel pump should supply 1/2 pint or more fuel within 15 seconds.

3. If fuel flow is below minimum, check for fuel restrictions. If there is no restrictions, check pump vacuum and/or pressure.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Fuel Injected

FUEL PRESSURE TEST

- Turn engine "OFF" and perform Fuel Pressure Relief procedure.

CAUTION: A small amount of fuel may be released, after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Place the cloth in an approved container when disconnect is completed.

- Install fuel pressure gage J-29658A/BT8205, or equivalent, at the outlet side of the in-line fuel filter.

- Start engine and observe fuel pressure reading. It should be 62-90 kPa (9-13 psi).

- Relieve fuel pressure.

- Remove fuel pressure gage.

- Re-install fuel hose or pipe assembly to in-line fuel filter.

- Start engine and check for fuel leaks.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB # 90-6C-89, Dated 9/90

Some 1985-90 engines equipped with 2.5L, 2.8L, 4.3L, 5.0L, 5.7L or 7.4L may experience a condition where fuel delivery is interrupted to the engine causing a "no start condition". This condition may be caused by deterioration of the in-tank fuel pump coupler hose located between the fuel pump sending unit and the fuel pump. This condition may be repaired by replacing the original coupler hose with a new VITON coupler hose kit P/N 25028041. The kit consist of a new VITON hose and two clamps.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Mechanical Fuel Pump

FUEL PUMP PRESSURE TEST

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be (4 to 6.5 psi). 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pressure: Testing and Inspection Fuel Pump Vacuum Test - Mechanical Fuel Pump

FUEL PUMP VACUUM TEST

1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least (15" Hg.). If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.

Fuel Pressure: Testing and Inspection Fuel System Pressure Test - Carbureted

Fuel Pump Flow Test:

1. Connect hose from carburetor fuel feed line to a suitable unbreakable container and crank engine. 2. Fuel pump should supply 1/2 pint or more in 15 seconds. 3. If flow is below minimum, check for fuel restriction. If there is no restriction, check pump pressure and/or vacuum.

Fuel Pump Pressure Test:

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be 4 to 6.5 psi. 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pump Vacuum Test:

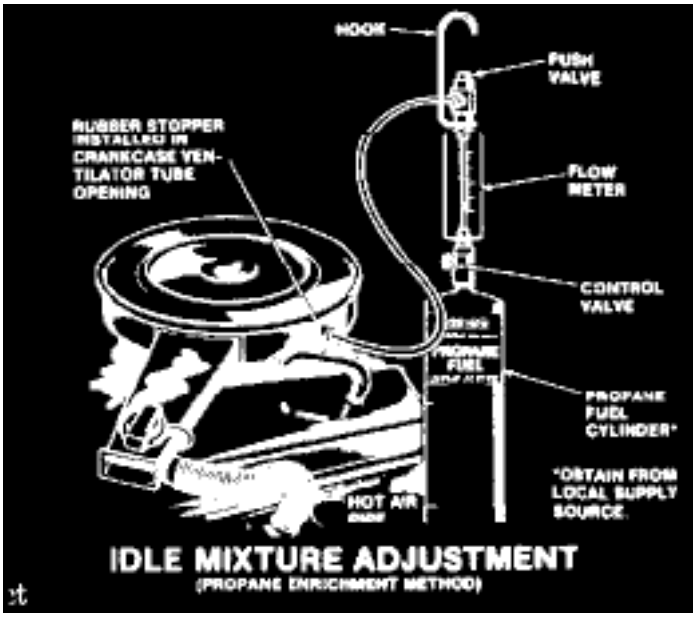
1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least 15" Hg. If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.



Air/Fuel Mixture: Adjustments Federal

Light Duty

NOTE: Vehicles with a Gross Vehicle Weight Rating (GVWR) below 6000 lbs (8500 lbs for California), and passenger carrying vehicles with a capacity of 12 persons or less, are Light Duty Emissions Vehicles.

NOTE: Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement or high emissions as determined by official inspections. Adjusting mixture by other than the following method may violate Federal and or California or other state or Provincial laws. Because of the sealed idle mixture needles, the idle mixture checking procedure requires artificial enrichment by adding propane.

1. Set parking brake and block drive wheel. Engine must be at normal operating temperature and air conditioning off. 2. Disconnect and plug EGR and cannister purge vacuum hoses. 3. Connect an accurate tachometer to engine. 4. Disconnect vacuum advance and set timing to specification. Reconnect vacuum hose. See: Ignition Timing 5. Set carburetor idle speed to specification. See: Fuel Delivery and Air Induction/Adjustments 6. Disconnect crankcase ventilation tube from air cleaner.

Fig. 61 - Propane Enrichment Tool Installation

7. Using tool J-26911, insert hose with rubber stopper, from propane valve into crankcase ventilation tube opening in air cleaner. Propane cartridge

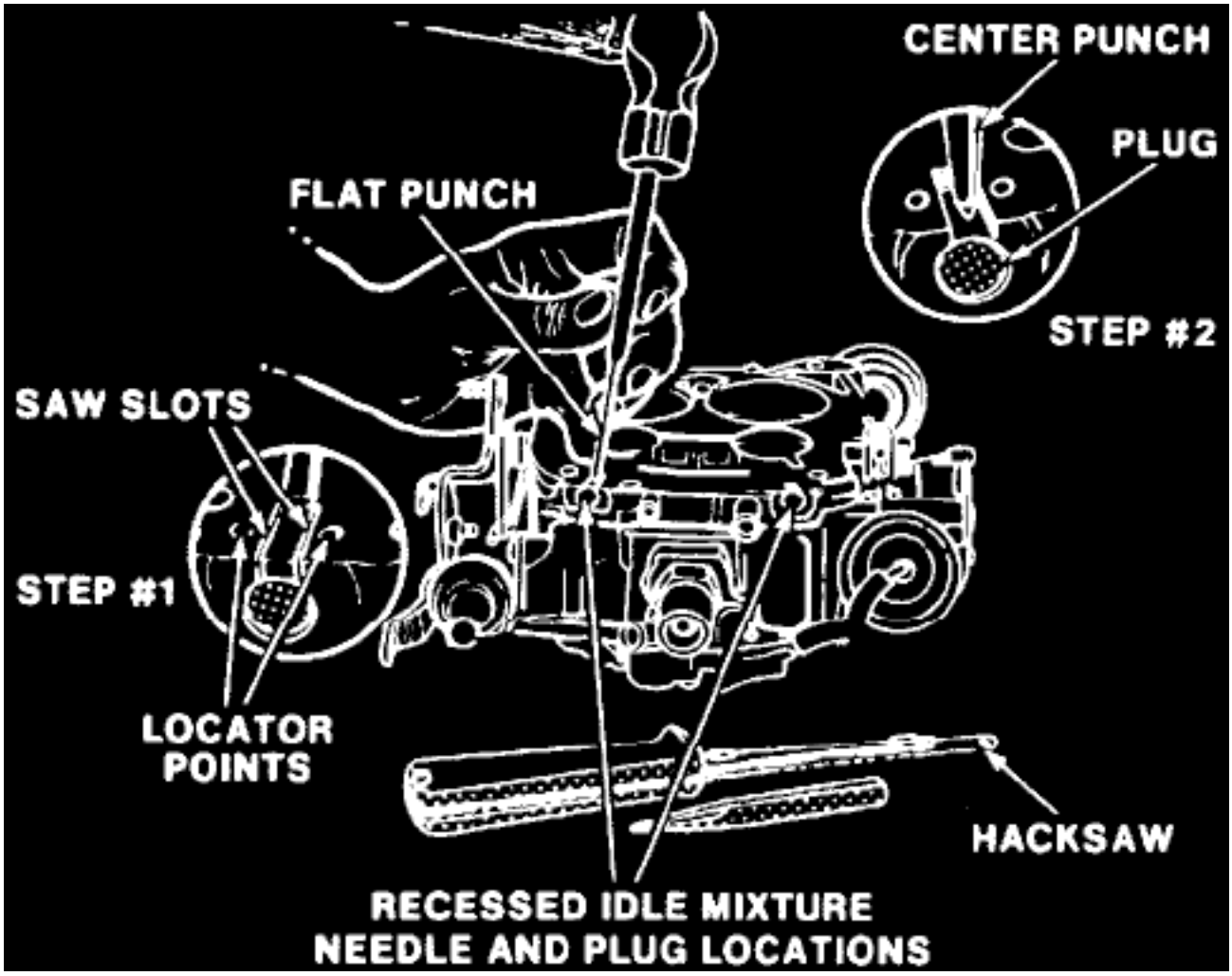
must be vertical.

8. With engine idling in drive (neutral for manual shifts) slowly open propane control valve while pressing button. Continue to add propane until

speed drops due to over richness. Note maximum engine speed (enriched speed).

9. If the enriched idle speed is within the enriched idle specification the mixture is correct. Go to step 17.

Enrichment Specification: See: Idle Speed/Specifications



10. If the enriched idle speed is not within specification, remove mixture screw plugs as follows:

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.

11. Using tool J29030 or equivalent, lightly seat mixture needles, then back out equally, just enough so engine will run. 12. Place transmission in drive (automatic) or neutral (manual). 13. Back each screw out (richen 1/8 turn at a time until maximum idle speed is obtained). Then using base idle speed adjustment screw, set idle speed

to the enriched idle specification. See: Idle Speed/Specifications

14. Turn each mixture screw in (clockwise) 1/8 turn at a time until idle speed reaches base idle speed. 15. Re-check enriched speed with propane. If not within specification, repeat adjustment beginning with step 12. 16. After adjustments are complete, seal the idle mixture needle setting using silicone sealant or equivalent. The sealer is required to prevent

tampering with the setting and to prevent the possibility of loss of fuel vapors.

17. Check and adjust fast idle speed. See: Fuel Delivery and Air Induction/Adjustments 18. Turn off engine. Remove propane tool, connect crankcase ventilation tube. Unplug and reconnect vacuum hoses. Install air cleaner.

Heavy Duty

NOTES:

- Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement, or high emissions as determined by official inspections.

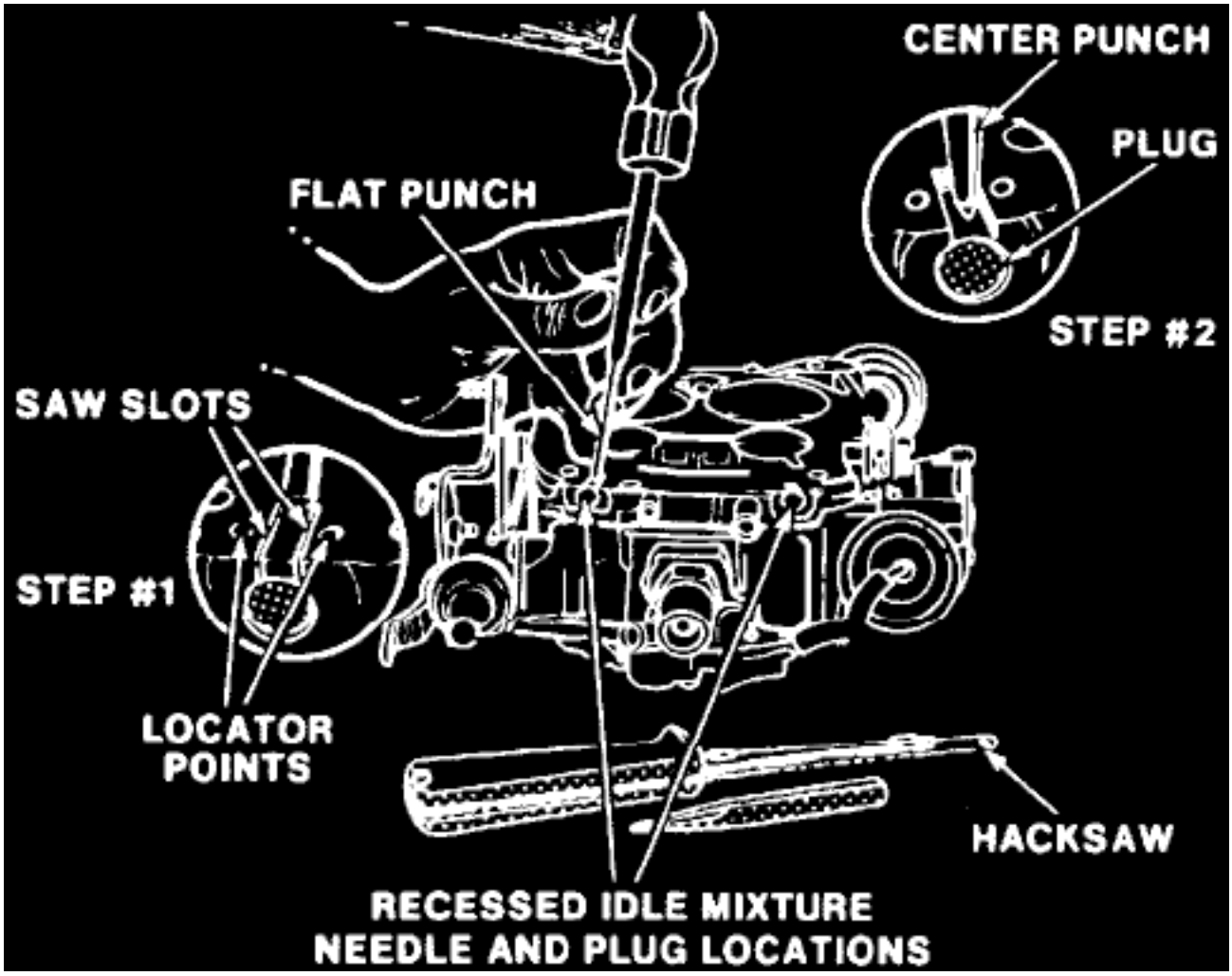
- If necessary, remove idle needle plugs:

- Perform this adjustment with engine at operating temperature, parking brake applied, drive wheels blocked and transmission in park or neutral.

ADJUSTMENT PROCEDURE

1. Remove air cleaner. 2. Connect tachometer and vacuum gage to engine. 3. As a preliminary adjustment, turn idle mixture needles in lightly to seat and back out 2 turns.

NOTE: Do not turn idle mixture needle tightly against seat or damage may result.



4. With engine running (choke wide open and transmission in neutral) adjust idle speed screw to curb idle speed. See: Idle Speed/Adjustments/Idle

Speed

5. Adjust each idle mixture needle to obtain highest RPM. 6. Repeat steps 4 and 5 until "best" idle is obtained. 7. If necessary, reset curb idle speed. See: Idle Speed/Adjustments/Idle Speed/Federal 8. After adjustments are complete, seal the idle mixture needle setting using silicone sealant or equivalent. 9. Check and if necessary, adjust throttle lever actuator.See: Idle Speed/Adjustments/Idle Speed

10. Check and if necessary, adjust fast idle speed. See: Idle Speed/Adjustments/Fast Idle Speed 11. Turn off engine, remove gages, unplug and reconnect vacuum hoses. Install air cleaner. 12. Remove block from drive wheel.

CONCEALMENT PLUG REMOVAL

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

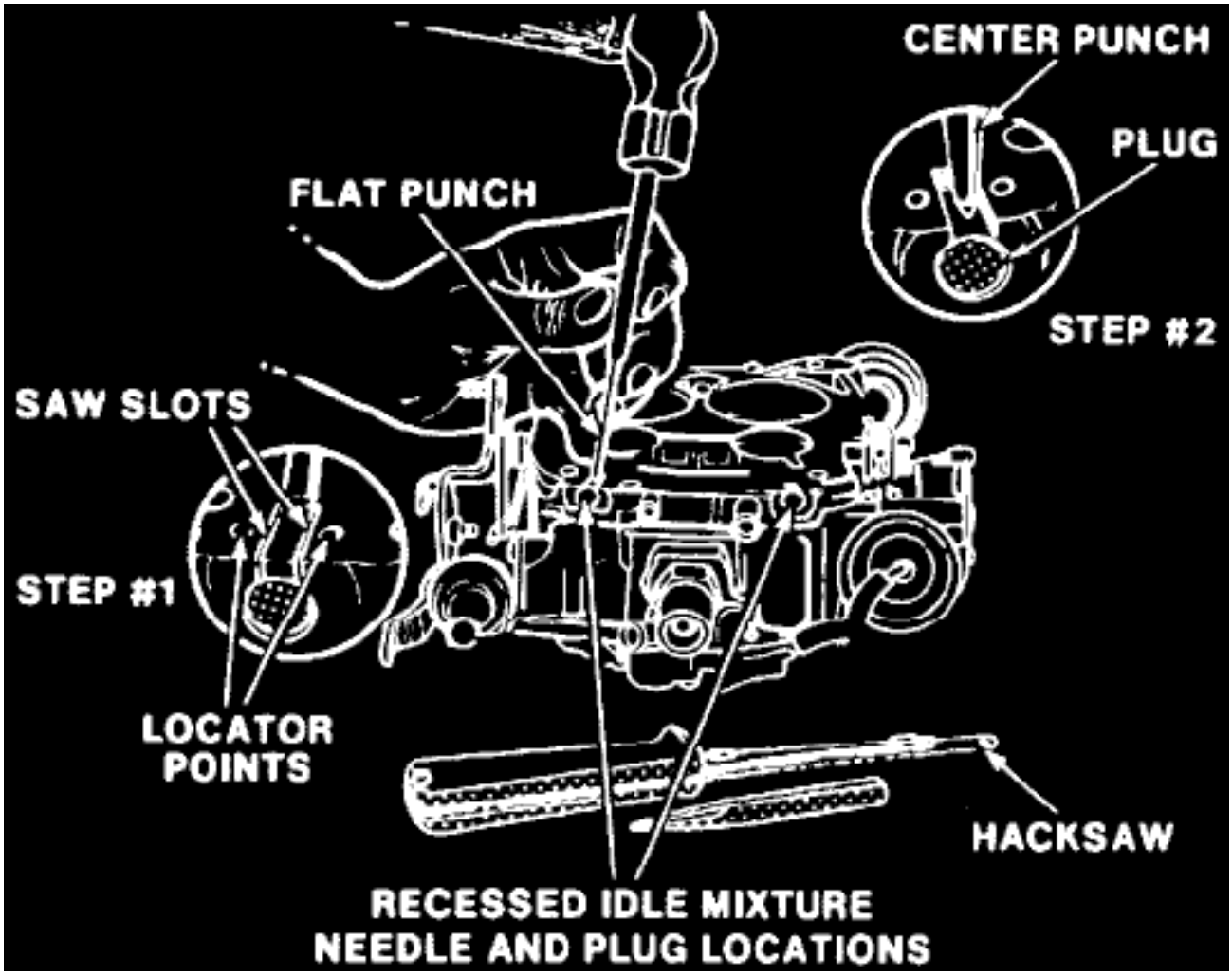
- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.



Air/Fuel Mixture: Adjustments California

IDLE MIXTURE NEEDLES ADJUSTMENT

1. Remove concealment plugs if necessary:

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.

NOTE: Always use a new carburetor base gasket.

2. Using tool J030930, BT-7610-B, or equivalent, remove both idle mixture needles and springs for inspection:

- Needles must not be bent, burred or otherwise damaged.

- Inspect both idle needle openings in the throttle body for any damage or foreign material. Clean as necessary.

3. Install idle mixture needles and springs:

- Turn both mixture needles clockwise until lightly seated.

- Turn each mixture needle counter clockwise 3 turns.

4. Disconnect vacuum hose to canister purge valve and plug it. 5. Place a spacer (0.75 to 0.10 inches) between accelerator pump lever and Throttle Position Sensor (TPS) plunger. 6. Connect dwell meter to Mixture Control (M/C) solenoid dwell lead. This is a green connection breaking out of the main wiring harness leading to

carburetor.

NOTE: Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested

7. Start engine and allow it to reach normal operating temperature. 8. While idling in "DRIVE" (NEUTRAL for manual transmission) adjust both mixture needles equally, in 1/8 turn increments, until dwell reading

varies within the 25-35° range, attempting to be as close to 30° as possible.

NOTE: If reading is too high, turn mixture needles clockwise. If reading is too low, turn mixture needles counterclockwise. Allow time for dwell reading to stabilize after each adjustment.

9. After adjustments are complete, seal the idle mixture needle opening in the throttle body, using silicone sealant or equivalent.

10. Check and adjust idle speed.

Idle Speed: Specifications Enriched Idle Speed

ENRICHED IDLE SPEED

Carburetor Number

17085206 ..... 20 17085208 10
17085209 ..... 50 17085210 10
17085211 50

17085220 ..... 75 17085221 75
17085222 ..... 20 17085223 50
17085224 20

17085225 ..... 50 17085226 20
17085227 ..... 20 17085228 30
17085229 30

17085230 ..... 20 17085231 40
17085235 ..... 80 17085239 75
17085283 75

17085284 ..... 20 17085285 20
17085290 ..... 30 17085291 100
17085292 ..... 30 17085293 100

NOTE: Enriched Idle Speed value is added to base idle speed. This value is used during the idle mixture adjustment procedure.

Idle Speed: Specifications Idle Speed

CURB IDLE SPEED

Light Duty

Manual ..... 700 rpm Automatic ..... 550 rpm (High Altitude 600)

Heavy Duty

Manual ..... 600 rpm Automatic ..... 700 rpm

A/C ON IDLE SPEED

Manual ..... 800 rpm Automatic ..... 650 rpm

FAST IDLE SPEED

Light Duty

Manual ..... 1300 rpm Automatic

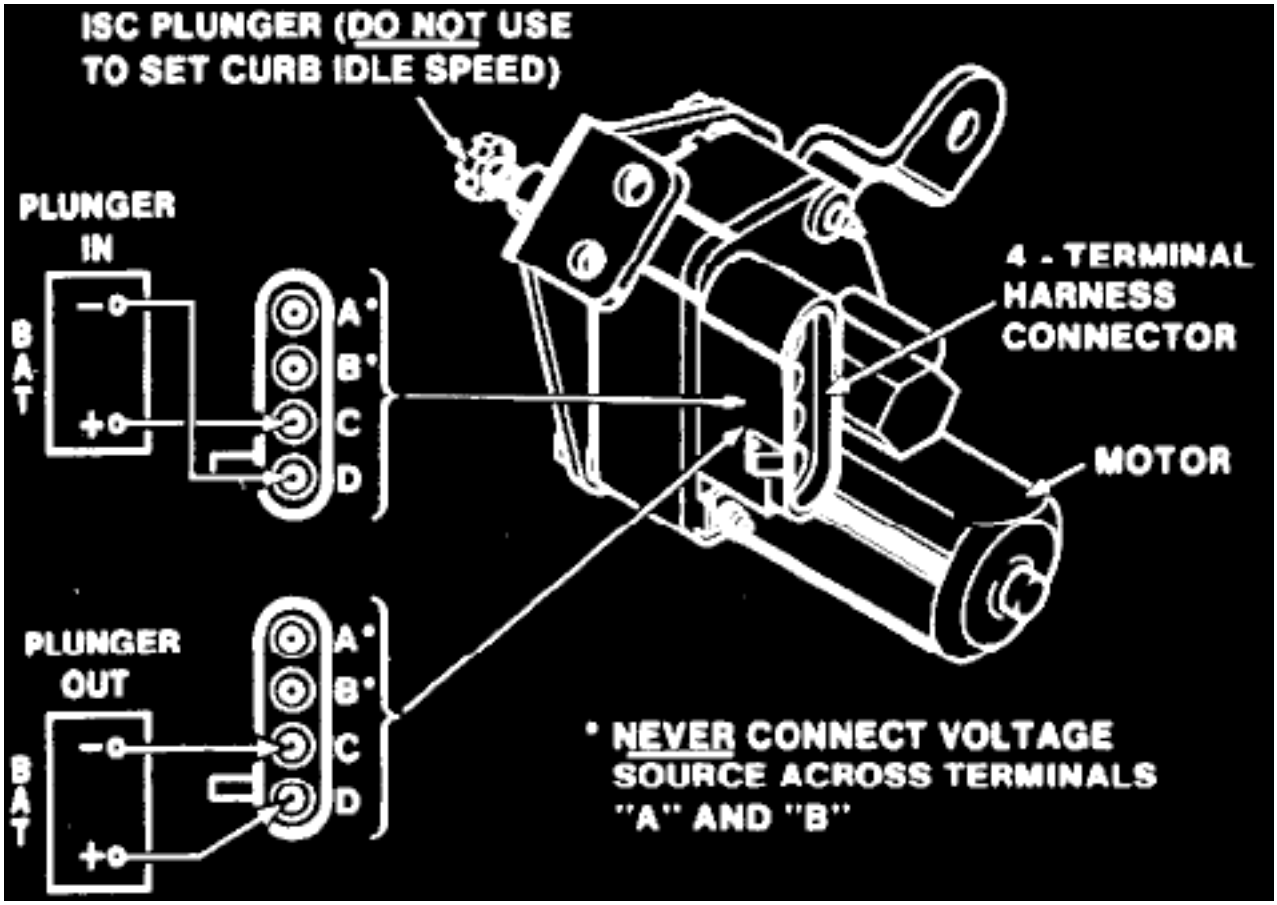
Federal ..... 1600 rpm California ..... 1800 rpm

High Altitude ..... 1400 rpm

Heavy Duty

Automatic/Manual ..... 1900 rpm

NOTE: All fast idle speeds are measured with the fast idle cam on the high step.



Idle Speed: Adjustments Idle Speed

California

NOTE: On engines equipped with an Idle Speed Control (ISC) motor, idle speed is controlled by an electrical signal from the Electronic Control Module (ECM). Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows.

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures:

- Check and adjust ignition timing.

- Disconnect and plug vacuum lines for evaporative purge and EGR valve.

2. Before starting engine, place transmission in "PARK" (automatic) or "NEUTRAL" (manual), set parking brake and block drive wheels. 3. Connect dwell meter to Mixture Control (M/C) solenoid dwell lead. This is a green connection breaking out of the main wiring harness leading to

carburetor.

NOTE: Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF". 5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary). 6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

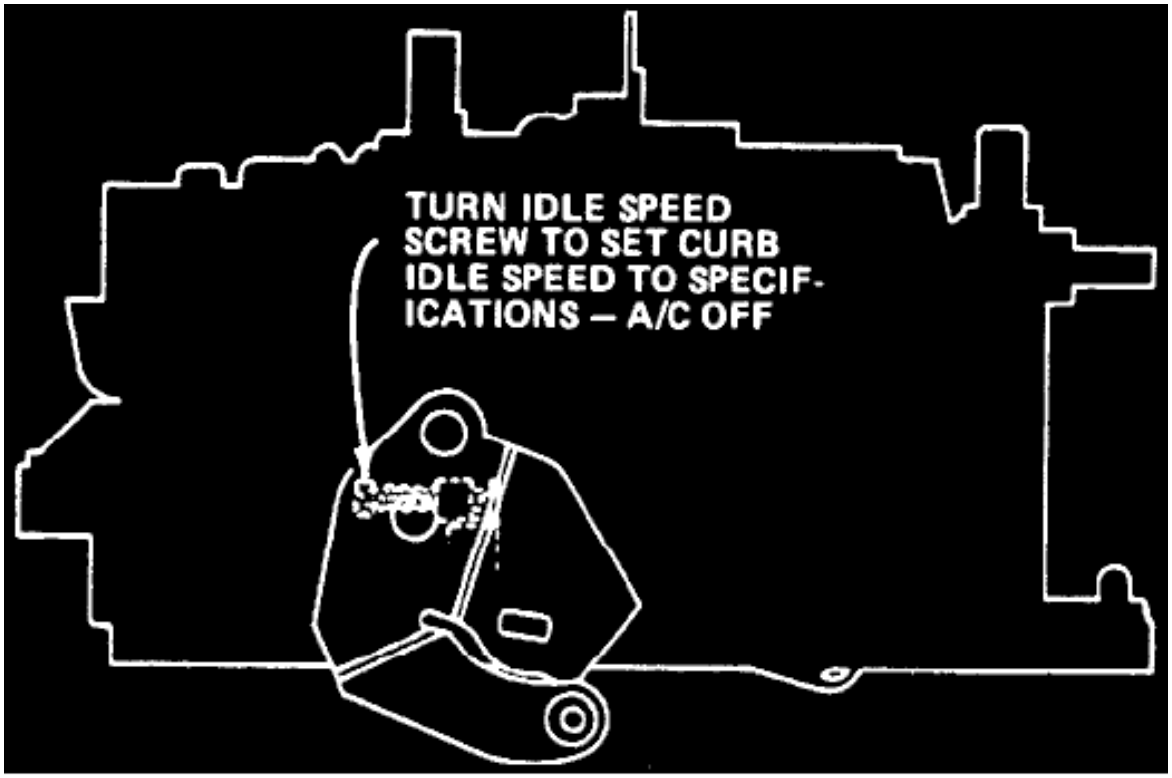
7. Unplug connector from ISC motor.

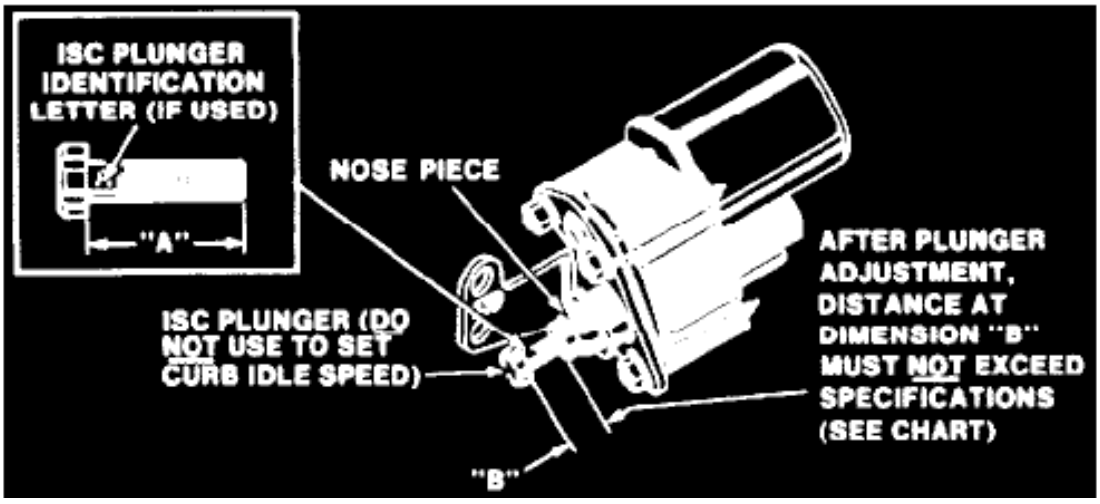
8. Fully retract ISC plunger by applying 12 volts to terminal "C" ad grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place automatic transmission in "DRIVE".


TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIF-ICATIONS – A/C OFF


ISC PLUNGER IDENTIFICATION LETTER (IF USED)
"A"
NOSE PIECE
ISC PLUNGER (DO NOT USE TO SET CURB IDLE SPEED)
"B"
AFTER PLUNGER ADJUSTMENT, DISTANCE AT DIMENSION "B" MUST NOT EXCEED SPECIFICATIONS (SEE CHART)

11. With ISC plunger fully retracted, adjust carburetor base (slow idle stop screw to 470 RPM (minimum authority). 12. Place transmission in "PARK" (automatic transmissions). 13. Fully extend ISC plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC motor connection. Leave power

applied only long enough to extend the plunger.

14. MANUAL TRANSMISSIONS: Using tool J29607 or BT-8022 or equivalent, turn ISC plunger to obtain 900 RPM (Maximum Authority). 15. AUTOMATIC TRANSMISSIONS:

- With transmission in "PARK", using tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

- With parking brake set and drive wheels blocked, place transmission in "DRIVE". Turn ISC plunger to obtain 900 RPM (Maximum Authority).

16. Recheck ISC "Maximum Authority" RPM with voltage applied to ISC motor (step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nosepiece. Dimension "B" must not exceed that shown

in below chart.

IDLE SPEED CONTROL PLUNGER		
IDENTIFICATION LETTER	PLUNGER LENGTH DIMENSION A	AFTER ADJUSTMENT (STEPS 14, 15, or 16), DISTANCE AT DIMENSION "B" MUST NOT EXCEED
NONE	14.1 mm (9/16")	5.6 mm (7/32")
NONE	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/64")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1")	17.1 mm (43/64")
L	27.5 mm (1 3/32")	19.0 mm (3/4")
J	30.0 mm (1 3/16")	21.5 mm (27/32")
N	32.0 mm (1 17/64")	23.5 mm (59/64")
T	34.0 mm (1 11/32")	25.5 mm (1")

18. Fully retract ISC plunger (step 8). Place transmission in "PARK" (automatic) or "NEUTRAL" (manual) and turn ignition "OFF". Disconnect 12

volt power source, ground lead, tachometer and dwell meters. With ignition "OFF" reconnect four terminal harness connector to ISC motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By

restoring the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Federal

PRELIMINARY PROCEDURES

- Warm engine to normal operating temperature (upper radiator hose hot).

- Turn "OFF" all accessories, including A/C.

- Check Timing (adjust if not to specification). See: Ignition Timing

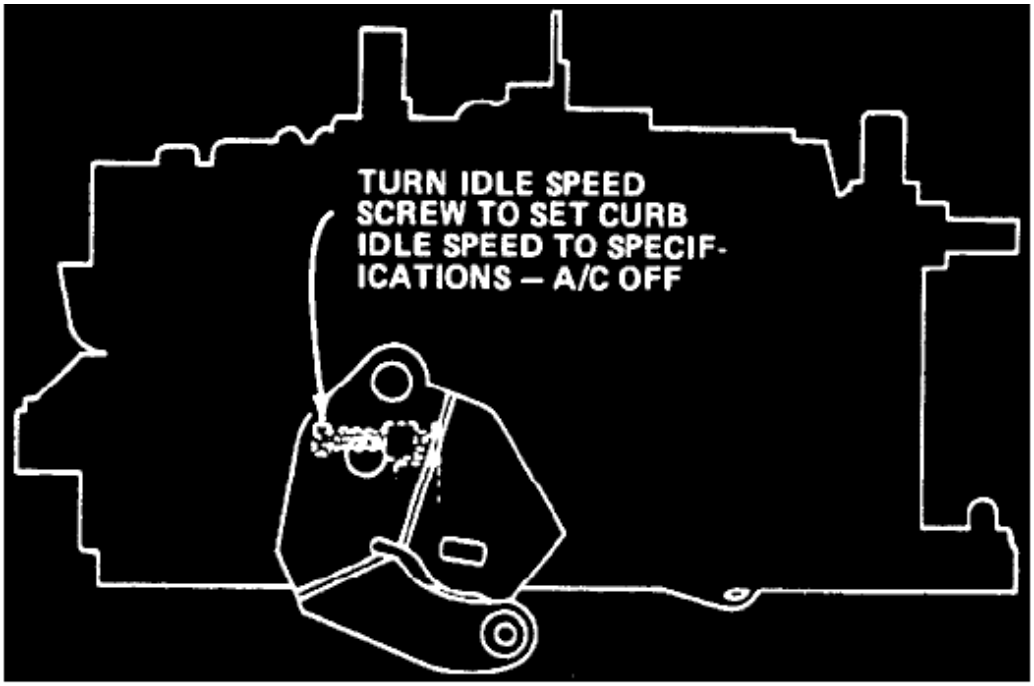
- Connect tachometer.

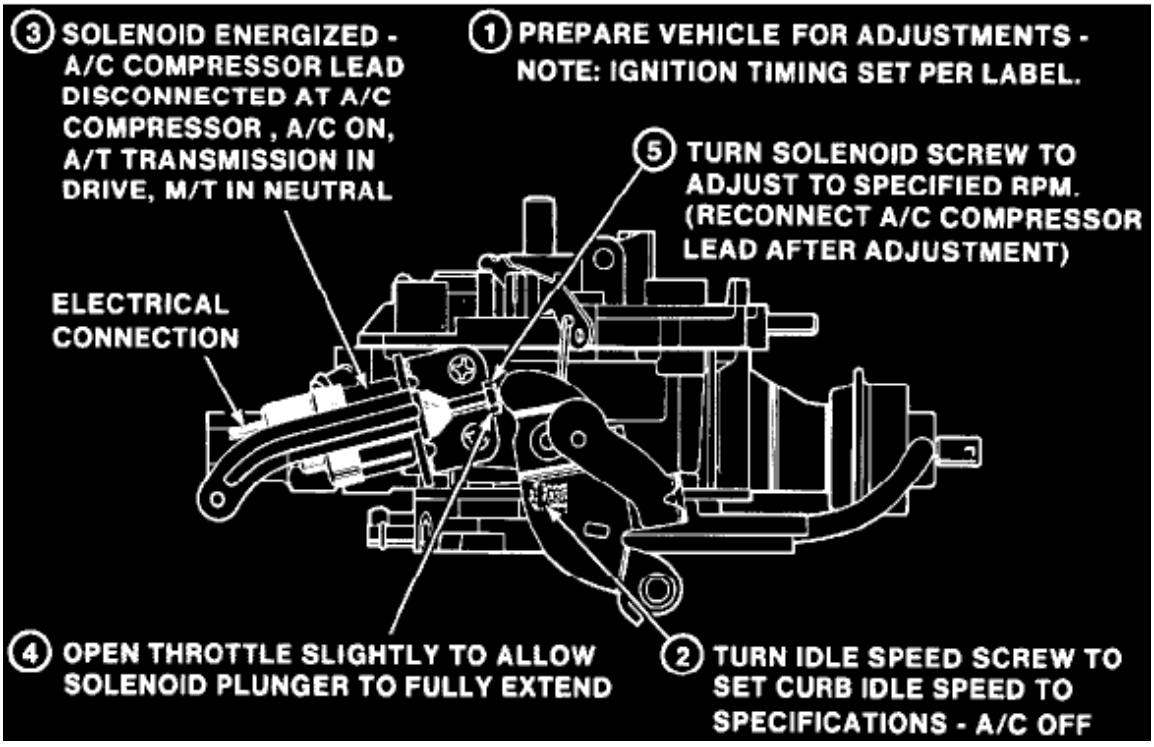
CAUTION: Exercise care not to ground the TACH terminal (which is located next to the BAT connector) as this may damage the Electronic Control Module (ECM) or coil.

CURB IDLE SPEED

- Disconnect and plug vacuum hose to EGR valve and canister purge.

- Adjust curb idle speed.


TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIF-ICATIONS – A/C OFF


3 SOLENOID ENERGIZED - A/C COMPRESSOR LEAD DISCONNECTED AT A/C COMPRESSOR , A/C ON, A/T TRANSMISSION IN DRIVE, M/T IN NEUTRAL
1 PREPARE VEHICLE FOR ADJUSTMENTS - NOTE: IGNITION TIMING SET PER LABEL.
5 TURN SOLENOID SCREW TO ADJUST TO SPECIFIED RPM. (RECONNECT A/C COMPRESSOR LEAD AFTER ADJUSTMENT)
ELECTRICAL CONNECTION
4 OPEN THROTTLE SLIGHTLY TO ALLOW SOLENOID PLUNGER TO FULLY EXTEND
2 TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIFICATIONS - A/C OFF

Without A/C -

Turn idle speed screw to specified curb idle (automatic transmissions in drive with wheels blocked and parking brake set). See: Specifications

With A/C -

With A/C "OFF", turn idle speed screw to specified curb idle (automatic transmissions in drive with wheels blocked and parking brake set).

- Disconnect wire to A/C compressor clutch and turn A/C "ON".

- Open throttle momentarily to assure solenoid plunger is fully extended.

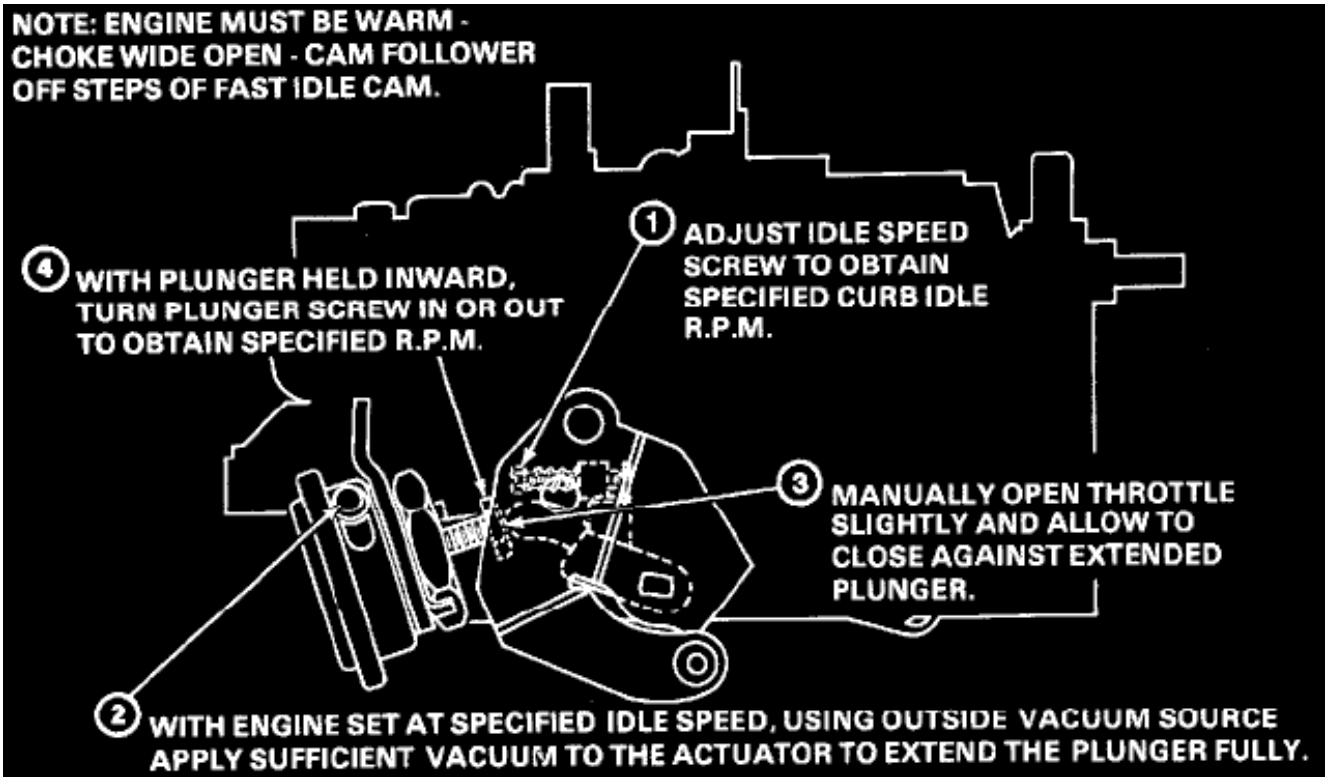
- Turn solenoid screw to the specified idle speed. See: Specifications

- Reconnect wire to compressor clutch.

THROTTLE LEVER ACTUATOR

- Disconnect vacuum hose from solenoid valve to the actuator diaphragm.

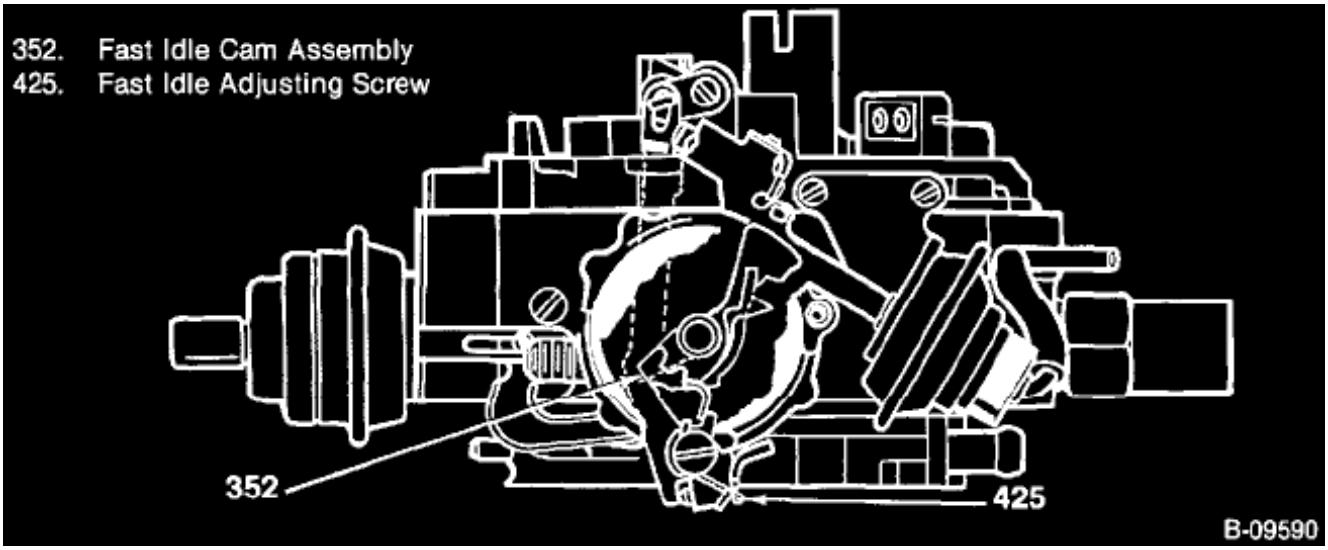
- Connect an external vacuum source to the diaphragm and apply 20 inches of vacuum.



- Manually open the throttle slightly and allow it to close against the extended actuator plunger. With engine warm, idle speed should be:

Federal - 1500 rpm California - 1600 rpm

NOTE: The throttle lever actuator is designed to control emissions by holding the throttle open slightly during deceleration and coasting.



Idle Speed: Adjustments Fast Idle Speed

Carbureted

Fast Idle Adjustment

Check and, if necessary, adjust ignition timing before adjusting fast idle speed. Make all adjustments with engine at normal operating temperature, choke fully open, air cleaner installed and A/C control off, if equipped.

1. Disconnect and plug vacuum hoses as directed on vehicle emission control label.

2. Position fast idle screw on specified step of fast idle cam as directed on vehicle emission control label.

3. Turn fast idle screw in or out and adjust fast idle speed to specifications.

With Carburator Only

Check and, if necessary, adjust ignition timing before adjusting fast idle speed. Make all adjustments with engine at normal operating temperature, choke fully open, air cleaner installed and A/C control off, if equipped.

1. Disconnect and plug vacuum hoses as directed on vehicle emission control label.

2. Position fast idle screw on specified step of fast idle cam as directed on vehicle emission control label.

3. Turn fast idle screw in or out and adjust fast idle speed to specifications.

DO THIS	DON'T DO THIS
First, Inspect the vehicle for a reusable aftermarket excessively/over- oiled air filter	DO NOT repair MAF sensors under warranty if concerns result from the use of an excessively/over-oiled aftermarket, reusable air filter.

Air Filter Element: Customer Interest Engine, A/T - Shift/Driveability Concerns/MIL ON

Bulletin No.: 04-07-30-013B

Date: February 01, 2007

INFORMATION

Subject: Automatic Transmission Shift, Engine Driveability Concerns or Service Engine Soon (SES) Light On as a Result of the Use of an Excessively/Over-Oiled Aftermarket, Reusable Air Filter

Models: 2007 and Prior GM Cars and Light Duty Trucks 2007 and Prior Saturn Models 2003-2007 HUMMER H2 2006-2007 HUMMER H3 2005-2007 Saab 9-7X

Supercede:

This bulletin is being revised to add models and model years. Please discard Corporate Bulletin Number 04-07-30-013A (Section 07 - Transmission/Transaxle).

The use of an excessively/over-oiled aftermarket, reusable air filter may result in:

Service Engine Soon (SES) light on

Transmission shift concerns, slipping and damaged clutch(es) or band(s)

Engine driveability concerns, poor acceleration from a stop, limited engine RPM range

The oil that is used on these air filter elements may be transferred onto the Mass Air Flow (MAF) sensor causing contamination of the sensor. As a result, the Grams per Second (GPS) signal from the MAF may be low and any or all of the concerns listed above may occur.

When servicing a vehicle with any of these concerns, be sure to check for the presence of an aftermarket reusable, excessively/over-oiled air filter. The MAF, GPS reading should be compared to a like vehicle with an OEM air box and filter under the same driving conditions to verify the concern.

The use of an aftermarket reusable air filter DOES NOT void the vehicle's warranty.

If an aftermarket reusable air filter is used, technicians should inspect the MAF sensor element and the air induction hose for contamination of oil prior to making warranty repairs.

Transmission or engine driveability concerns (related to the MAF sensor being contaminated with oil) that are the result of the use of an aftermarket reusable, excessively/over-oiled air filter are not considered to be warrantable repair items.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer

DO THIS	DON'T DO THIS
First, Inspect the vehicle for a reusable aftermarket excessively/over- oiled air filter	DO NOT repair MAF sensors under warranty if concerns result from the use of an excessively/over-oiled aftermarket, reusable air filter.

Air Filter Element: All Technical Service Bulletins Engine, A/T - Shift/Driveability Concerns/MIL ON

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Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Tune-up and Engine Performance Checks > Air Cleaner Housing > Air Filter Element > Component Information > Technical Service Bulletins > All Other Service Bulletins for Air Filter Element: > 8594 > Jun > 85 > Cruise Control - Engine Surge More Noticeable Low Speeds

Cruise Controller: All Technical Service Bulletins Cruise Control - Engine Surge More Noticeable Low Speeds

85-94 9 JUNE, 1985 Subject:

CRUISE CONTROL SURGE

Model and Year: 1985 MONTE CARLO WITH 4.3L V6 (ENGINE CODE Z) AND CRUISE CONTROL (K34)

TO: ALL CHEVROLET DEALERS

Some 1985 Monte Carlos with 4.3L engines may exhibit an engine surge condition when the cruise control is operating. This condition is more noticeable at low speeds.

Many items can cause a cruise control surge condition, so a general cruise system inspection should be made first. Some things to look for are:

1. Proper cruise control cable routing (no kinks or sharp bends.)

2. Proper cruise control cable adjustment.

3. Vacuum hoses to accumulator or servo leaking or restricted.

4. Binding speedometer cable.

Refer to the 1985 Shop Manual for specifications on Items #1 and #2.

A new cruise control module (P/N 25031946) is available to repair the surge condition. Early production vehicles used P/N 25031953.

A road test should be performed to verify that the surge condition has been repaired.

Use applicable labor operation.

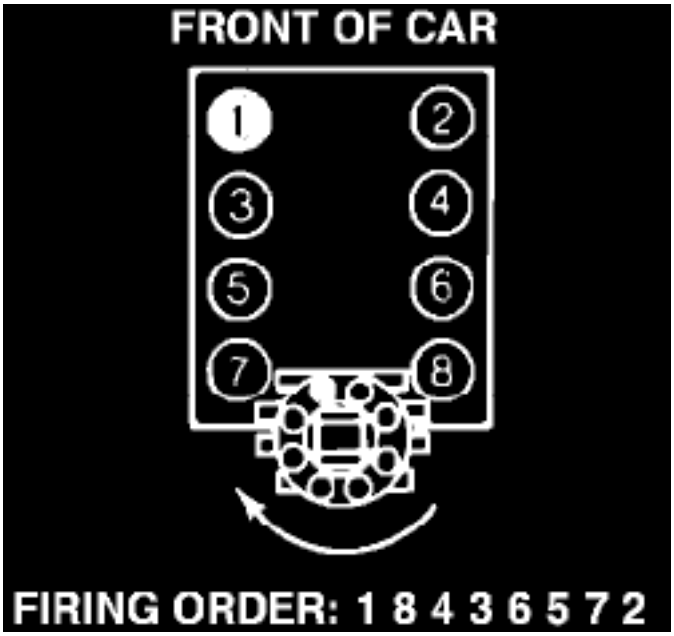
Fuel Pressure Release: Service and Repair

Throttle Body Injected Engines

1. Remove fuel pump fuse from fuse box. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and replace fuel pump fuse.

Port Injected Engines

1. Disconnect fuel tank harness connector. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and reconnect fuel tank harness connector.



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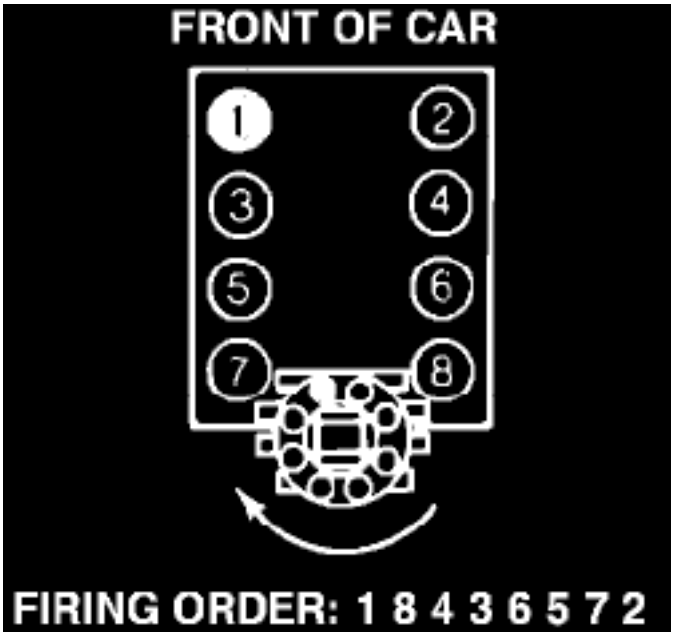

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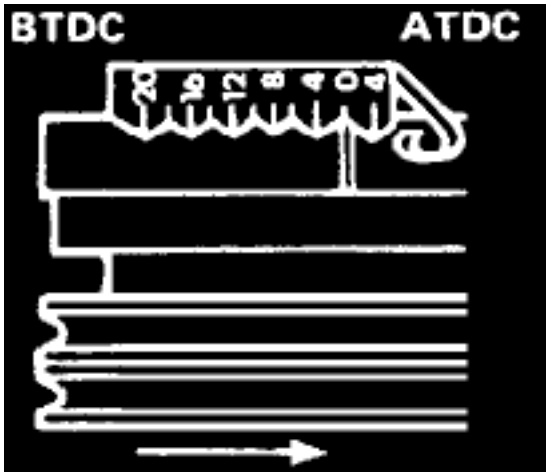
BTDC
ATDC

Spark Plug Wire: Customer Interest Engine - Miss, Hesitation, or Roughness

Number: 93-35-6D Section: 6D Date: OCT. 1992 Corporate Bulletin No.: 716404R ASE No.: A1, A8

Subject: ENGINE MISS HESITATION OR ROUGHNESS DUE TO PIERCED SECONDARY IGNITION COMPONENTS

Model and Year: 1980-93 ALL PASSENGER CARS AND TRUCKS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 87-121, DATED MAY 1987. THE 1989-93 MODEL YEARS HAVE BEEN ADDED. ALL COPIES OF 87-121 SHOULD BE DISCARDED.

During the diagnosis procedure for an engine miss, hesitation or roughness, a spark plug or spark plug wire condition may be suspected. Several types of commercial or homemade diagnostic equipment required the secondary ignition boots or wire to be pierced. This is normally done to check for spark plug firing or to perform a cylinder balance test. Similarly the use of pliers or other such tools to disengage a spark plug boot may pierce or damage the boot or wire. Secondary ignition components should not be pierced for any reason.

Piercing a spark plug wire and/or distributor boot may create a condition that will not be immediately apparent. Over time, the hole in the pierced boot may allow a ground path to develop creating a plug misfire condition. Heavily moisture laden air in the vicinity of the pierced boot may accelerate this effect.

Piercing a secondary ignition wire creates a gap in the wire's conductive core. This gap is a point of high resistance. The current flow in the wire will increase to compensate for the higher wire resistance. Over time, the wire may fail creating a plug misfire condition. The time required for the condition to appear depends upon the extent of damage to the conductive core.

To help prevent future condition that are spark plug wire related, do not pierce or otherwise damage any secondary ignition component. Only use diagnostic equipment containing an inductive pick-up to check for spark plug firing or to perform cylinder balance tests. When disengaging a spark plug boot from the spark plug, twist the flanged boot 1/2 turn then pull on the boot only to remove the wire.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Tune-up and Engine Performance Checks > Spark Plug Wire <--> [Ignition Cable] > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Spark Plug Wire: > 93356D > Oct > 92 > Engine - Miss, Hesitation, or Roughness

Spark Plug Wire: All Technical Service Bulletins Engine - Miss, Hesitation, or Roughness

Number: 93-35-6D Section: 6D Date: OCT. 1992 Corporate Bulletin No.: 716404R ASE No.: A1, A8

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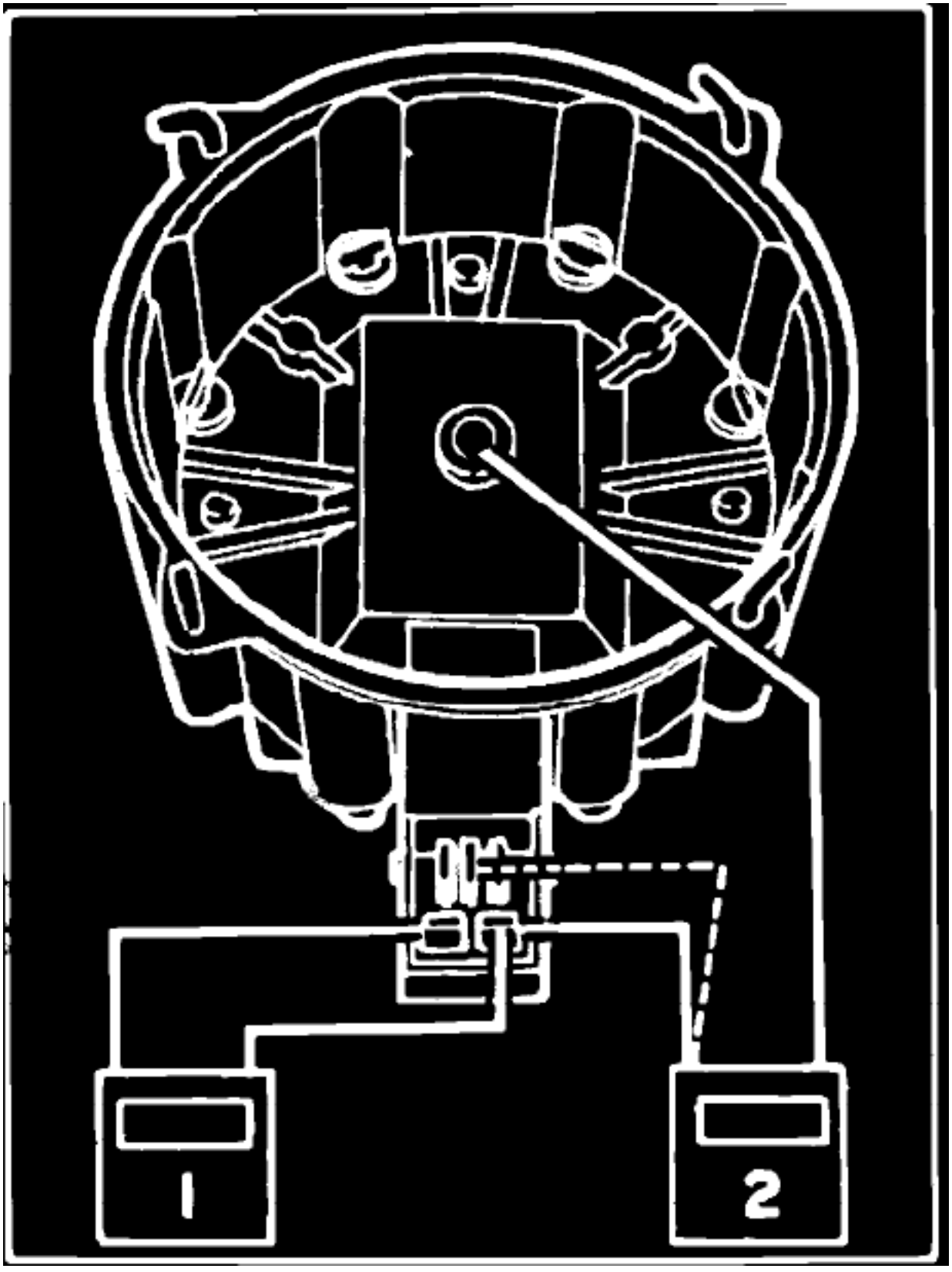
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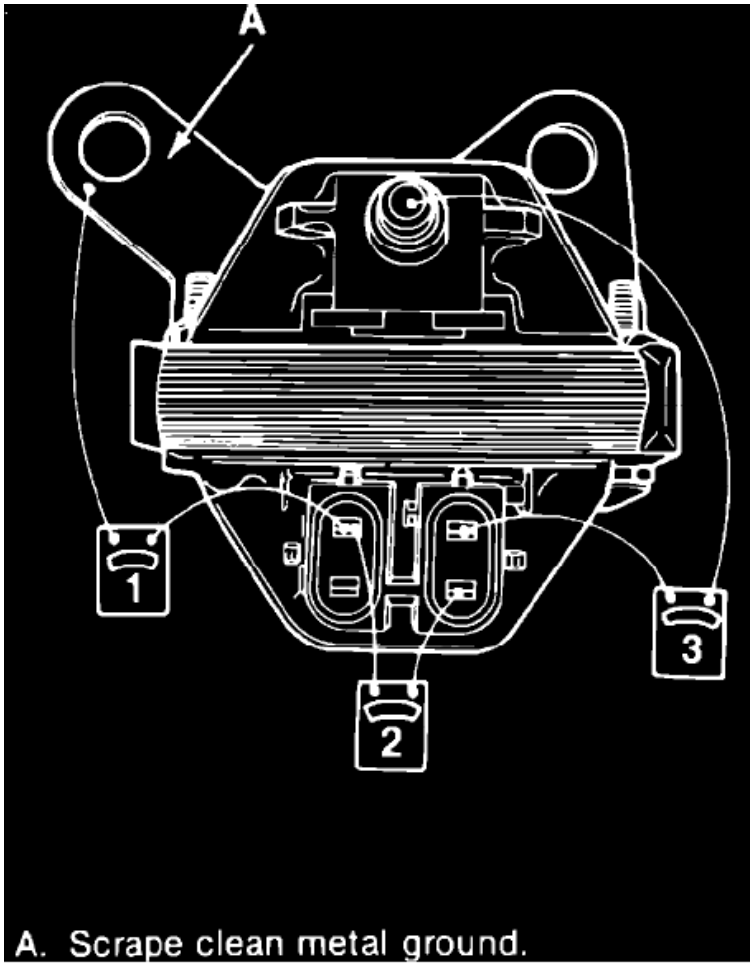
Distributor: Testing and Inspection

Fig. 10 Ignition coil test connections. Models w/internal coil


A
1
2
3
A. Scrape clean metal ground.

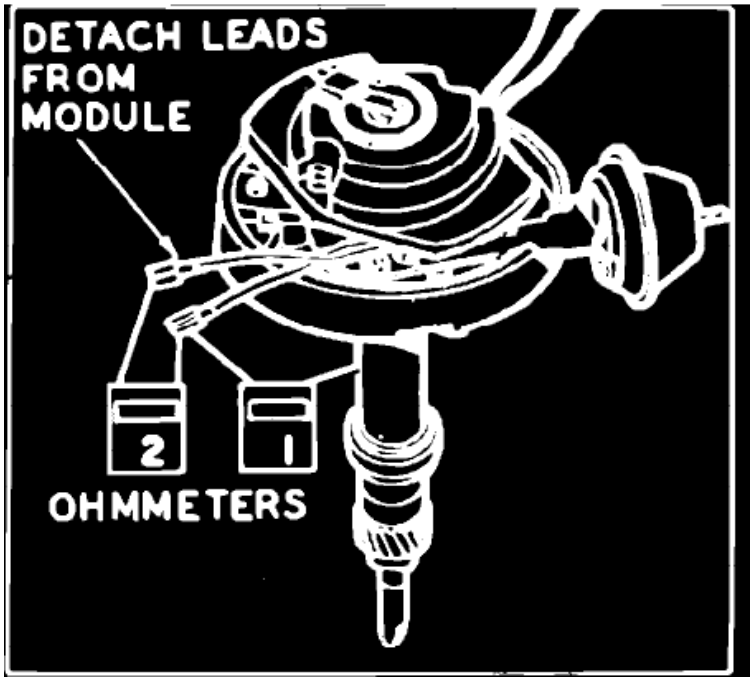

DETACH LEADS FROM MODULE
2
1
OHMMETERS

Fig. 11 Ignition coil test connections. Models w/remote coil

Fig. 12 Pickup coil (pole piece) test connections

Tester J-24624 is required to test the module. If this tester is not available, and malfunction still exists after performing the following checks, replace

module.

1. Remove distributor cap and coil assembly, as equipped.

2. Inspect cap, coil and rotor for arcing, carbon tracking and damage, and replace as needed.

3. On models with integral coil, proceed as follows:

a. Connect ohmmeter, Fig. 10, step 1. If reading is other than zero or very near to zero, the ignition coil must be replaced. b. If no ohmmeter reading was observed in step 1, reconnect ohmmeter both ways, Fig. 10, step 2. If both ohmmeter readings are infinite on

high scale, replace ignition coil.

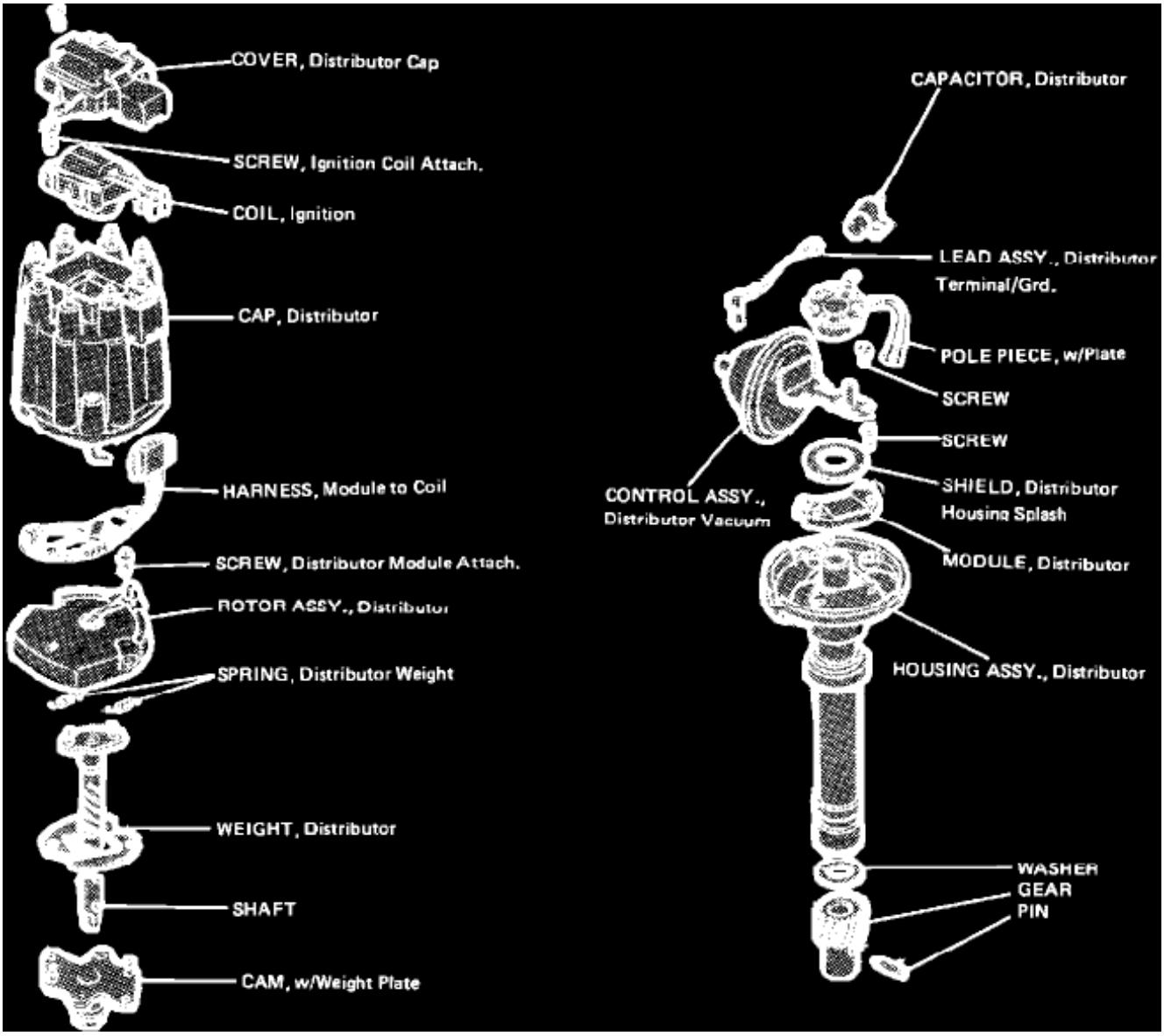
4. On models with remote coil, proceed as follows:

a. Connect ohmmeter, Fig. 11, step 1. If reading is not infinite, replace coil. b. Connect ohmmeter, Fig. 11, step 2. If reading is not zero or near zero, replace coil. c. Connect ohmmeter, Fig. 11, step 3. If reading is infinite, replace coil.

5. Connect an external vacuum source to the vacuum advance unit. Replace vacuum unit if inoperative.

6. If vacuum unit is operating properly, connect ohmmeter, Fig. 12, step 1. If ohmmeter reading on middle scale is not infinite at all times, pickup coil must be replaced.

7. With ohmmeter connected, Fig. 12, step 2, reading should be 500 to 1500 ohms.



Distributor: Service and Repair Distributor Service

Fig. 15 Typical High Energy Ignition (HEI) distributor exploded view

DISASSEMBLY

1. Remove distributor as outlined, then remove rotor, Fig. 15.

2. Remove advance springs and weights (if equipped).

3. Remove module retaining screws and move module to a position where connector may be removed.

4. Remove wires from module terminals.

5. Support distributor gear so that distributor shaft will not be damaged, then remove roll pin by driving it out with a punch.

6. Remove gear, shim and tanged washer from shaft. Remove any burrs that may have been caused by removal of roll pin. Some distributors do not use a shim or tanged washer.

7. Remove distributor shaft and magnet assembly.

8. Remove pole piece retaining screws, pole piece, magnet and pickup coil.

9. Remove lock ring from top of housing, pickup coil retainer and felt washer.

10. Remove vacuum advance unit (if equipped).

11. Remove capacitor and wiring harness from distributor housing.

ASSEMBLY

1. Install vacuum advance unit (if used) and secure with two screws, Fig. 15.

2. Place felt washer over lubricant reservoir at top of housing.

3. Position pick up coil retainer onto housing with vacuum advance arm over actuating pin of vacuum advance mechanism and secure with lock ring.

4. Install pick up coil magnet and pole piece. Loosely install the three retaining screws.

5. Install distributor shaft and rotate to check for even clearance all around between pole piece and shaft projections.

6. Move pole piece to provide even clearance and secure with three retaining screws.

7. Install drive onto shaft with teeth facing up. Drive gear has a dimple on one side next to drive pin hole. Align drive gear so that dimple is on same

side of shaft as the rotor pointer. Temporarily install rotor to ensure correct alignment.

8. Install tanged washer, shim and drive gear, then retain with a new roll pin.

9. Install capacitor and loosely install retaining screw.

10. Install connector on module with tab on top, then liberally apply silicone grease to bottom of module and install screws. Failure to apply silicone grease to module will cause excessive heat build up of module and premature failure.

11. Position wiring harness with grommet in housing notch, then connect pink wire to capacitor stud and black wire to capacitor retaining screw. Tighten screw.

12. Reconnect wires to module, then install centrifugal advance weights and springs.

Distributor: Service and Repair Distributor Replace

UNITS W/INTEGRAL COIL

Removal

1. Disconnect electrical connectors from distributor cap and disconnect 4 wire EST connector. Carefully bend connector locking tabs away from housing by hand to prevent damage to locking tabs.

2. Remove distributor cap assembly leaving plug wires connected and position cap aside.

3. Remove No. 1 spark plug, crank engine until compression pressure can be felt in No. 1 cylinder, then slowly rotate crankshaft until timing marks are aligned at TDC on compression stroke for No. 1 cylinder.

4. Disconnect battery ground cable, then mark position of distributor body in relation to engine and position of rotor contact in relation to distributor body.

5. Remove distributor hold-down bolt, raise distributor noting rotor rotation, place second mark on distributor housing to indicate position where rotor stops moving, then remove distributor. Do not rotate crankshaft with distributor removed from engine.

Installation

1. Ensure No. 1 cylinder is at TDC on compression stroke as outlined in removal procedure.

2. Align rotor with second mark made in step 5 of removal procedure.

3. Insert distributor into engine, aligning body with mark made on engine prior to removal, then seat distributor in engine. With distributor fully seated, marks made in step 4 of removal procedure should be aligned. If distributor will not seat against boss on engine, oil pump driveshaft may have to be rotated slightly to allow proper installation.

4. Install hold-down clamp and hand tighten retaining bolt.

5. Reverse remaining procedure to complete installation, then adjust ignition timing as outlined.

UNITS W/REMOTE COIL

Removal

1. Disconnect distributor harness and feed wire connectors from ignition coil and disconnect EST connector.

2. Remove distributor cap leaving plug wires connected and position cap aside.

3. Remove No. 1 spark plug, crank engine until compression pressure can be felt in No. 1 cylinder, then slowly rotate crankshaft until timing marks are aligned at TDC on compression stroke for No. 1 cylinder.

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Spark Plug: Customer Interest Engine - Spark Knock, Poor Performance

NUMBER: 86-B-77

GROUP: 6D - Engine Electrical

DATE: April, 1986

SUBJECT: SPARK KNOCK (PREIGNITION)

MODELS: 1984-85 C, K, G TRUCKS EQUIPPED WITH THE LE9 5.0L, LF3 5.0L, OR LS9 5.7L ENGINE AND ELECTRIC SPARK CONTROL (ESC) FEDERAL EMISSIONS AND ELECTRONIC SPARK TIMING (EST) CALIFORNIA EMISSIONS.

THIS BULLETIN CANCELS AND SUPERSEDES 86-B-21 (DECEMBER, 1985) ALL COPIES OF WHICH SHOULD BE DESTROYED.

Some 1984-85 vehicles equipped with the LE9 5.0L (VIN Code H), LF3 5.0L (VIN Code F), or LS9 5.7L (VIN Code L) engine may experience detonation (preignition) or poor performance when operating in a loaded condition or pulling a grade. As a result of the preignition, the ESC (Federal) or EST (California) retards the spark timing, and a noticeable reduction in performance may occur. In the event the preignition condition is not corrected by the ESC/EST spark retard, continued operation under these conditions could result in internal engine damage. To reduce the possibility of this occurrence, the spark plugs should be changed to a colder heat range. When these conditions exist, the original equipment (R44TS) spark plugs should be replaced with R43CTS (P/N 5613810). The correct spark plug gap is .045". Starting with 1986 vehicles, the LE9, LF3, LS9, and LT9 engines are built with the R43CTS spark plugs.

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NUMBER: 86-B-77

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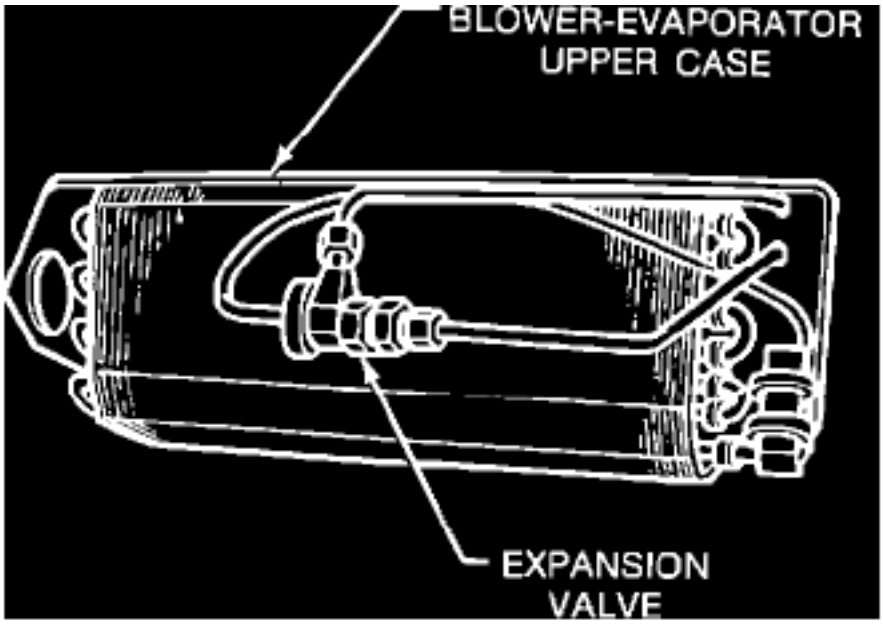
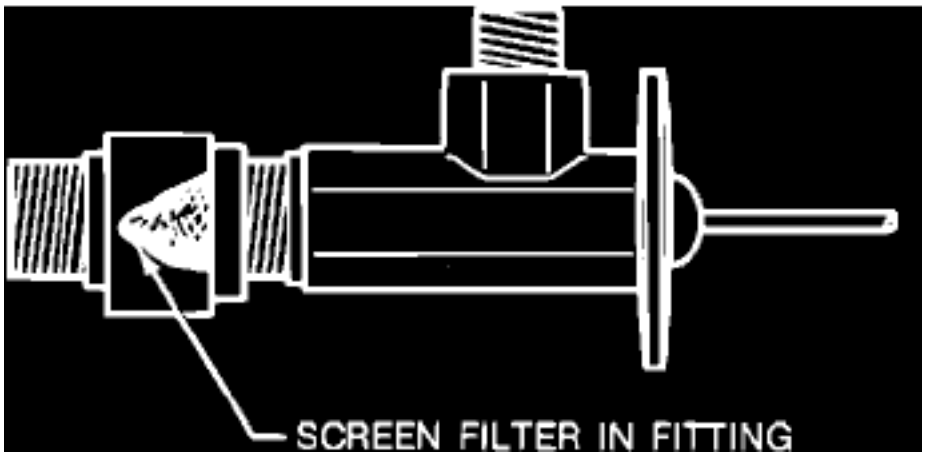




Expansion Valve: All Technical Service Bulletins A/T, Rear - Poor Performance

NUMBER: 86-B-45

GROUP: 1B-Air Conditioning

DATE: March, 1986

SUBJECT: REAR AIR CONDITIONING

MODELS: 1984-1985 C, K, G MODELS WITH REAR AIR CONDITIONING

Figure No. 1 - Rear Air Conditioning Expansion Valve

The thermal expansion valve (Refer to Figure No. 1) used in rear air conditioning units, contains a small "funnel shaped" screen. If this screen becomes plugged, the rear air conditioning unit will not function properly.

Figure No. 2

Harrison Radiator corrected this situation by installing the screen in the opposite direction from the original position. When viewed through the opening in the expansion valve fitting, the screen should be positioned as it appears in Figure No. 2. This allows any debris in the system to collect around the base of the screen, while permitting the rear air to function properly. Vehicles which are found to have plugged filter screens should have the screen cleaned and the direction reversed so it is the same as the valve shown in Figure No. 2.

Spark Plug: Specifications

Plug Tightening Torque 22 ft.lb

Engine	Year	Gap (inches)	Gap (mm)	Torque (ft-lb)
4-cyl. 1.9L (119)	1982-86	.044	1.1	—
4-cyl. 2.0L (122)	1983-84	.035	.89	7-15
4-cyl. 2.5L (151)	1985-90	.060	1.52	7-15
V-6 2.8L, 3.8L	1982-90	.045	1.14	7-15
V-6 4.3L	1985-90	.035	.89	7-15
6-cyl.	1981-89	.035	.89	17-27
8-cyl.	1981-86	.045	1.14	17-27
8-cyl.: Light Duty	1987-88	.035	.89	22
Heavy Duty	1987-88	.045	1.14	22
8-cyl.	1989-90	.035	.89	22

SPARK PLUGS

Compression Check: Specifications

Minimum, 698 kPa (100 psi) @ 200 rpm. The lowest cylinder reading should not be less than 80% of the highest. Perform compression test with engine at normal operating temperature, spark plugs removed and throttle wide open.

Valve Clearance: Specifications

FRONT TO REAR 6-250, 292.....
.....E-I-I-E-E-I-I-E-E-I-I-E V6-231.....
.....
.....E-I-I-E-I-E V6-262 Left Side.....
.....E-I-E-I-I-E Right Side.....
.....
.....E-I-I-E-I-E V8-267, 305, 350, 400.....
.....E-I-I-E-E-I-I-E V8-454....
.....
.....E-I-E-I-E-I-E-I

Valve Clearance: Adjustments

STATIC ADJUSTMENT

NOTE: This procedure does not apply to 231 V-6 engines.

1. Start engine and allow to reach normal operating temperature, then shut engine off.

2. With engine in position to fire No. 1 cylinder, adjust the following valves: V6-229 and 262, Exhaust Nos. 1, 5 and 6; Intake Nos. 1, 2 and 3. 6-250 and 292, Exhaust Nos. 1, 3 and 5; Intake Nos. 1, 2 and 4. V8 engines, Exhaust Nos. 1, 3, 4 and 8; Intake Nos. 1, 2, 5 and 7. To properly adjust valves, tighten adjusting nut until all lash is eliminated, then tighten nut the specified additional number of turns. On V8-454 / 7.4L engine, tighten nut 3/4 additional turn from zero lash. On all others, tighten nut one full turn from zero lash.

3. Turn crankshaft one complete revolution, which will bring engine in position to fire cylinders 4(V6) or 6(Inline 6 and V8). With engine in this position, adjust the following valves: V6-229 and 262, Exhaust Nos. 2, 3 and 4; Intake Nos. 4, 5 and 6. 6-250 and 292, Exhaust Nos. 2, 4 and 6; Intake Nos. 3, 5 and 6. V8 engines, Exhaust Nos. 2, 5, 6 and 7; Intake Nos. 3, 4, 6 and 8. When zero lash is obtained, tighten adjusting nuts as specified in step 2.

ENGINE RUNNING ADJUSTMENT

NOTE: The following procedure, performed with the engine running, should be done only in case readjustment is required.

1. After engine has been warmed to operating temperature, remove valve cover and install a new valve cover gasket.

2. With engine running at idle speed, back off valve rocker arm nut until rocker arm starts to clatter.

3. Turn rocker arm nut down slowly until the clatter just stops. This is the zero lash position.

4. Turn nut down 1/4 additional turn and pause 10 seconds until engine runs smoothly. Repeat additional 1/4 turns, pausing 10 seconds each time, until nut has been turned down the specified number of turns from the zero lash position. This preload adjustment must be done slowly to allow the lifter to adjust itself to prevent the possibility of interference between the intake valve head and top of piston, which might result in internal damage and/or bent pushrods. Noisy lifters should be replaced.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-90	Barometric, Manifold Absolute	3.8-5.5 @ 0-1000 3.6-5.3 @ 1000-200 3.5-5.1 @ 2000-300 3.3-5.0 @ 3000-400 3.2-4.8 @ 4000-500 3.0-4.6 @ 5000-600 2.9-4.5 @ 6000-700 2.5-4.3 @ 7000-

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-88	Vacuum	.50-.64 @ ign. on 1.7-3.0*

* 10 in./250 mm applied to unit.

Absolute Pressure Sensor: Specifications

MANIFOLD ABSOLUTE, VACUUM AND BAROMETRIC PRESSURE SENSORS

Engines may use one, or a combination of these sensors. All sensors appear the same. Manifold Absolute Pressure sensors have a vacuum line connected between the unit and manifold vacuum. On Barometric Pressure sensors, the line is not used and the connector is either open or has a filter installed over it. Pressure sensors also have a vacuum line between the sensor and intake manifold and only appear on carburetted models.

Barometric Pressure Sensors: Measure voltage with ignition on and engine off.

Manifold Absolute Pressure Sensors: Measure voltage with ignition on and engine off. Start engine and apply 10 in./ 250 mm Hg to unit, voltage should be 1.2-2.3 volts less.

Pressure Sensors: Measure voltage as indicated.

Absolute Pressure Sensor: Description and Operation

The barometric pressure sensor senses changes in barometric pressure and provides this information, through an electrical signal, to the ECM. The sensor produces a voltage signal of 3.5 - 4 volts to indicate barometric pressure. The voltage increases in proportion to increases in altitude (decreases in barometric pressure). This sensor is normally used with the MAP sensor.

Absolute Pressure Sensor: Service and Repair

The MAP and Vacuum sensors are accessible through the engine compartment. The BARO sensor may be located either in the engine compartment or strapped to the ECM harness under the dash panel.

Other than checking for loose hoses and electrical connections, the only service required of these sensors is replacement should diagnosis show any sensors to be faulty.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

The coolant temperature sensor supplies coolant temperature information to the ECM. It is mounted in the engine coolant stream and has high resistance when the engine is cold and low resistance when the engine is warm. The ECM receives this information and controls the various systems that are dependent on temperature for proper operation.

Coolant Temperature Sensor/Switch (For Computer): Service and Repair

1. Disconnect electrical connector and remove sensor.

2. Reverse procedure to install. Torque sensor to 72 in lbs.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Computers and Control Systems > Assembly Line Diagnostic Link (ALDL) Connector <--> [Data Link Connector] > Component Information > Locations > California Emissions

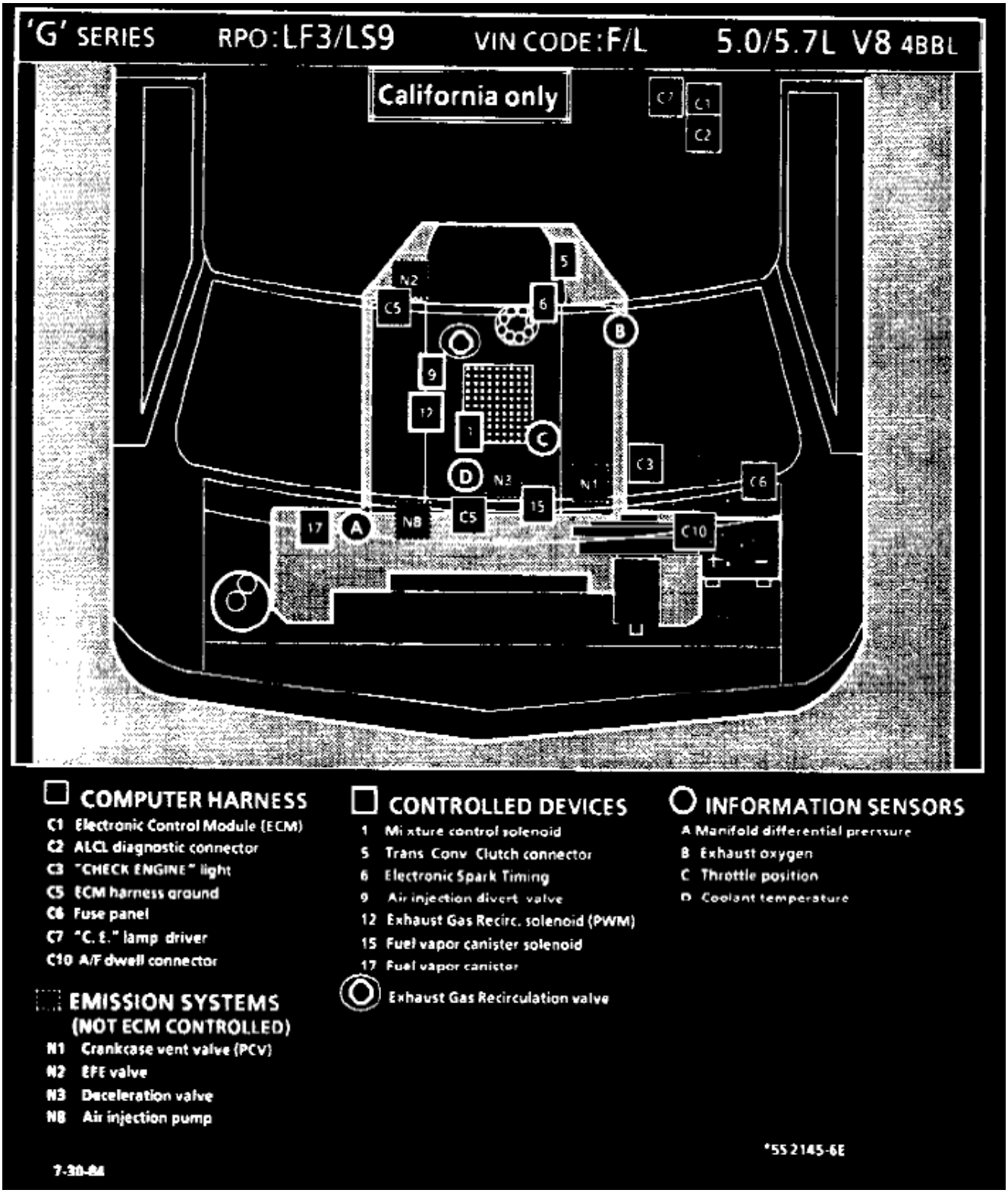


Figure 9 Component Locations - 5.0L/5.7L (G Series) - Calif.

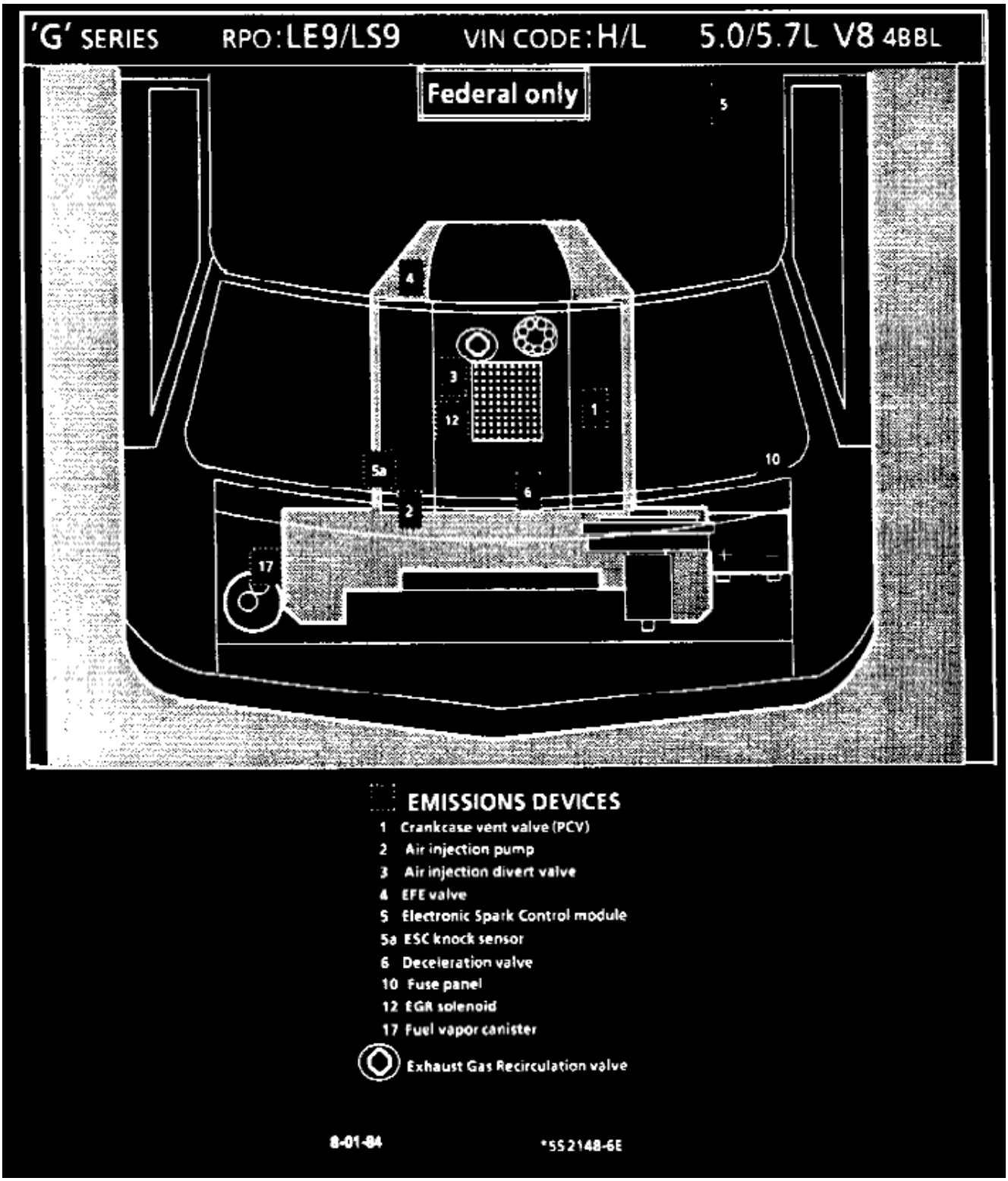


Figure 10 Component Locations - 5.0L/5.7L (G Series) - Federal

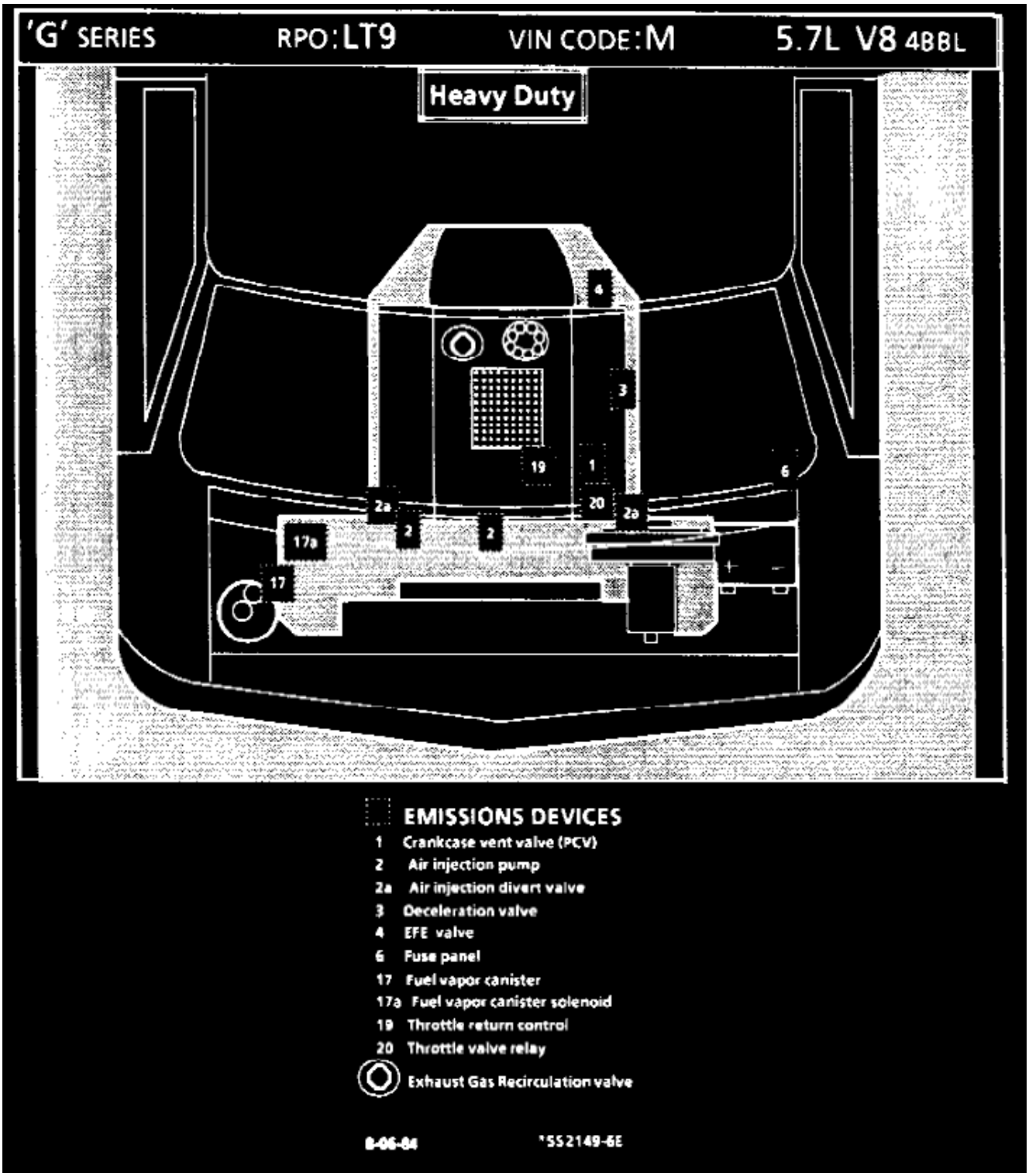
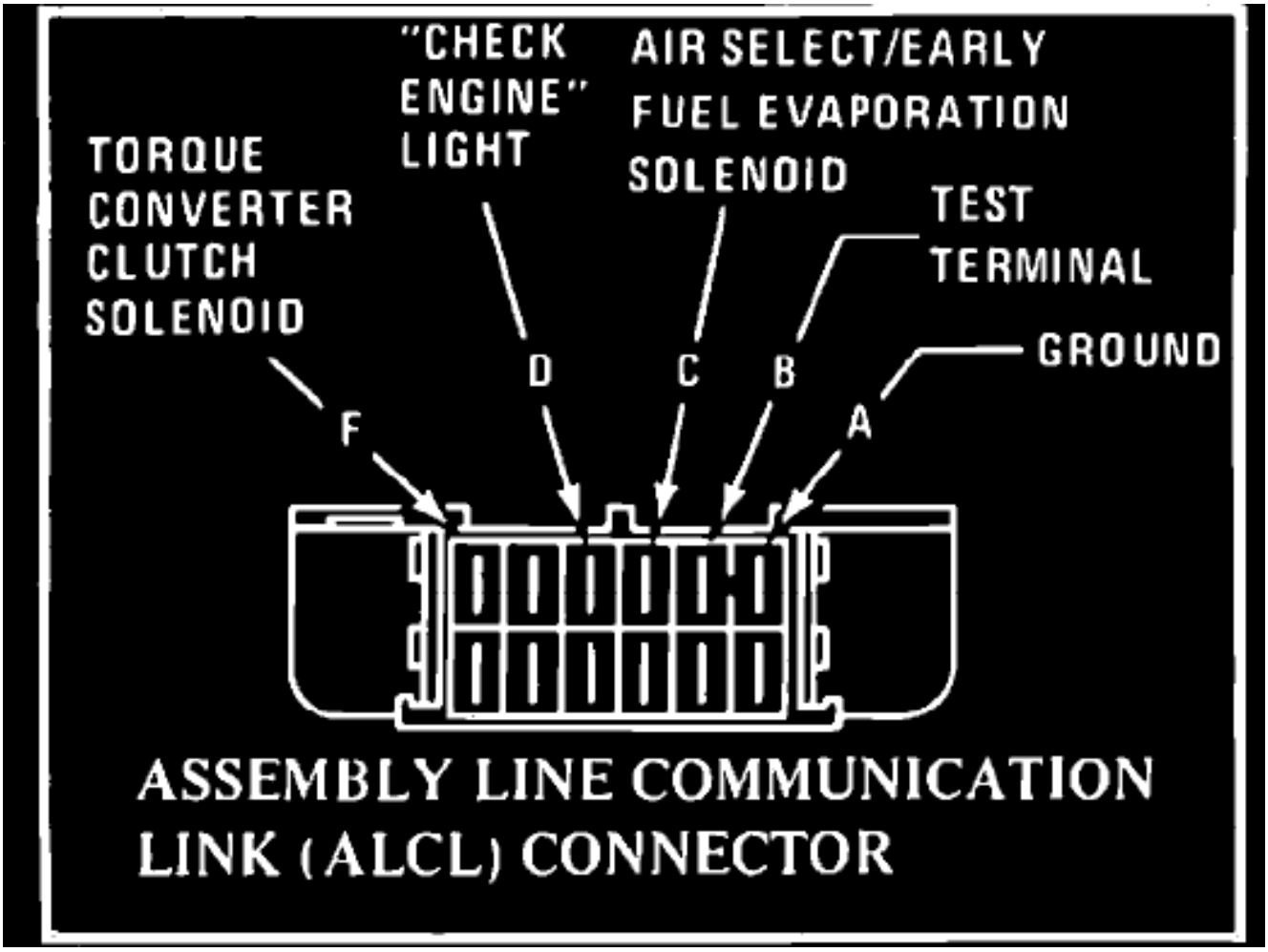


Figure 12 Component Locations - 5.7L (G Series) - Heavy Duty Emissions



Assembly Line Diagnostic Link (ALDL) Connector: Description and Operation

Figure 1 Terminal Arrangement In Connector

This connector is used in the assembly plant to connect a computer for checking of the system to see that it is functioning properly before shipping the vehicle. To obtain trouble codes with the ignition switch on and the engine either stopped or running the "test" terminal in this connector should be grounded. The "test" terminal should be ungrounded when starting the engine or the "Check Engine" lamp will not function properly.

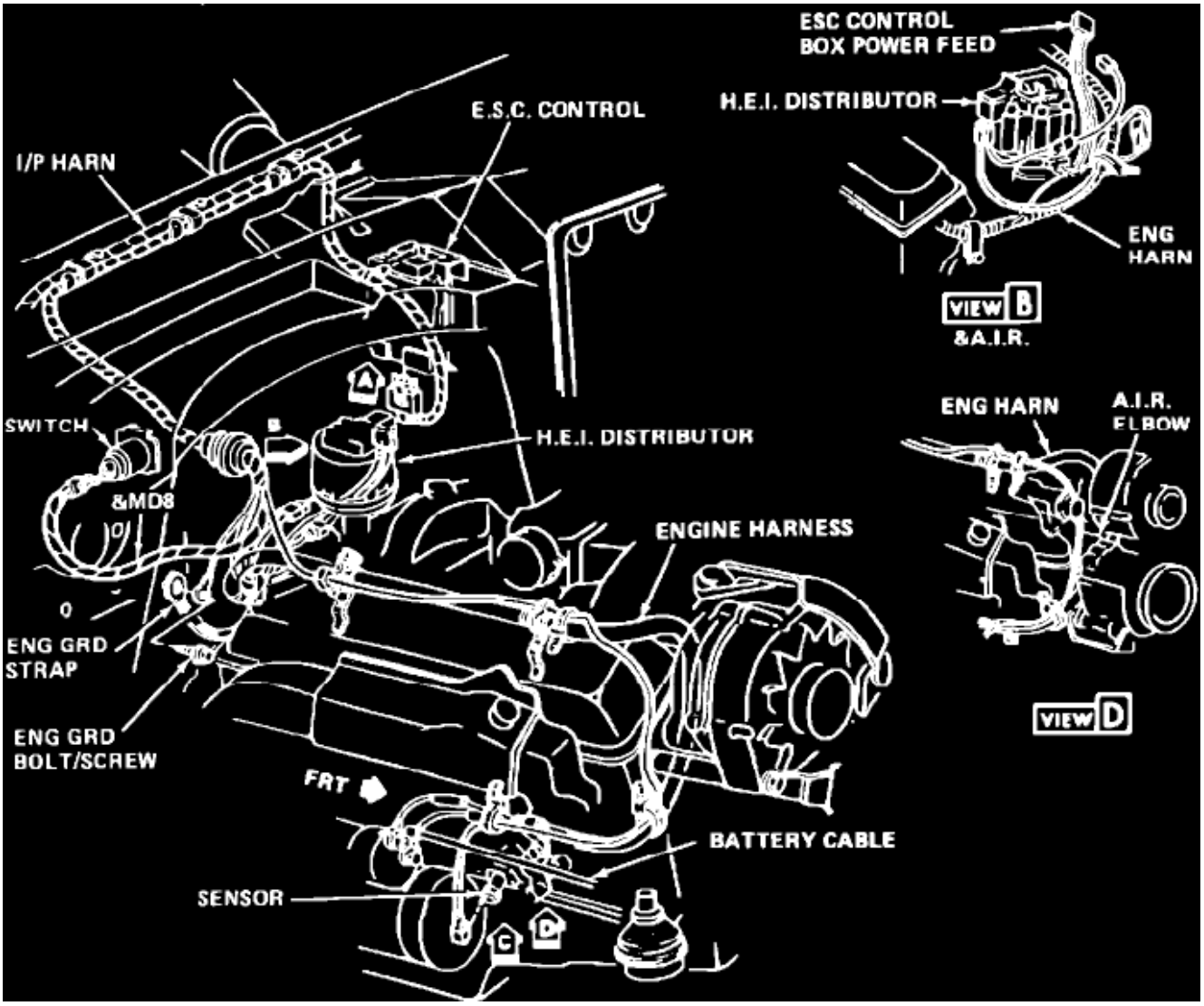


Fig. 46 Typical Electronic Spark System (ESC)

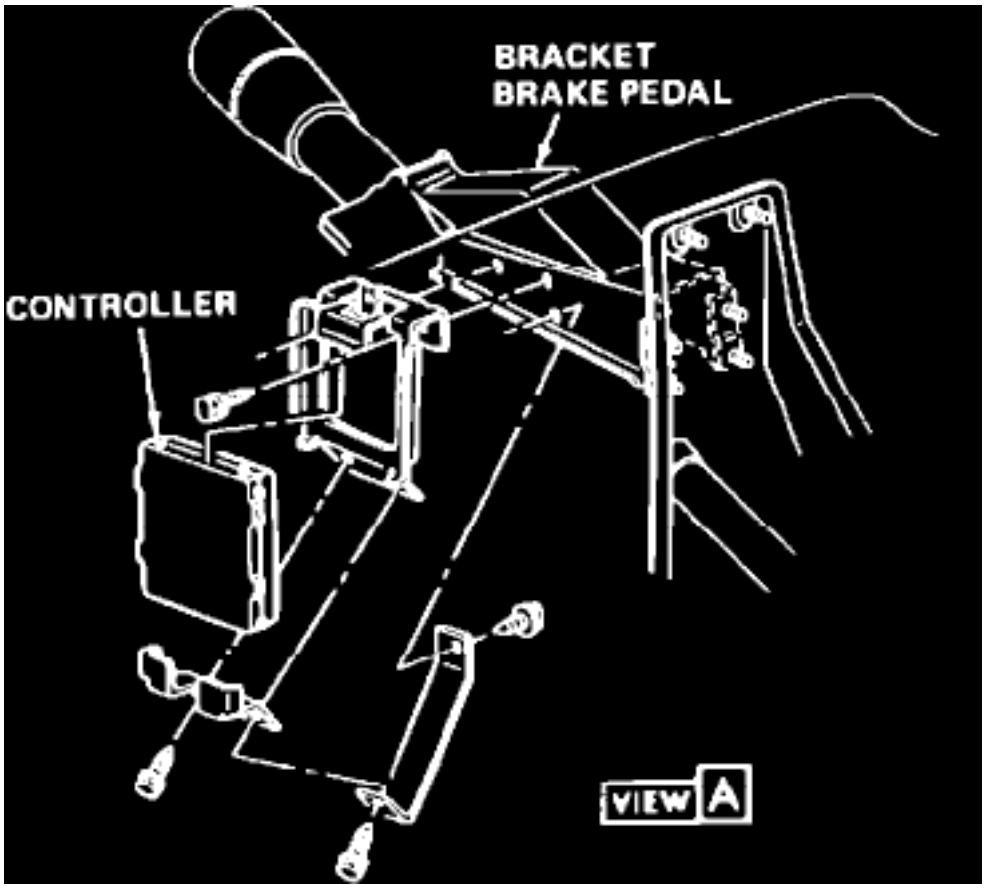
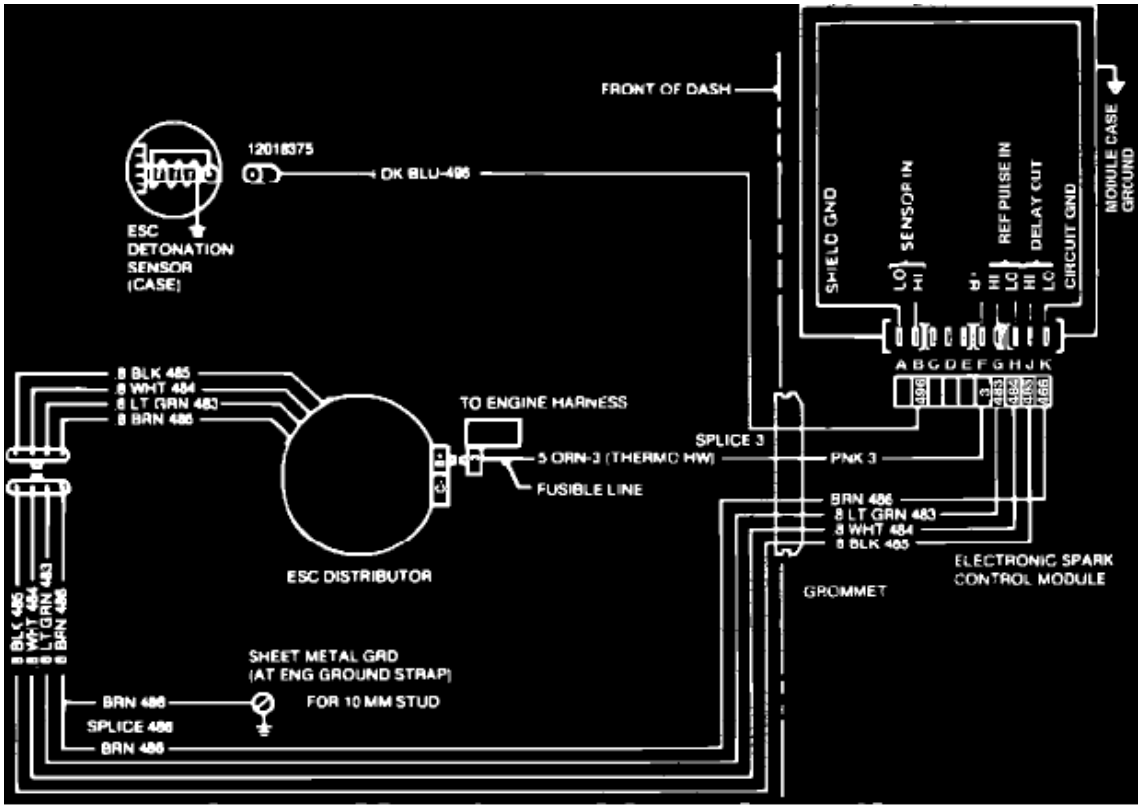
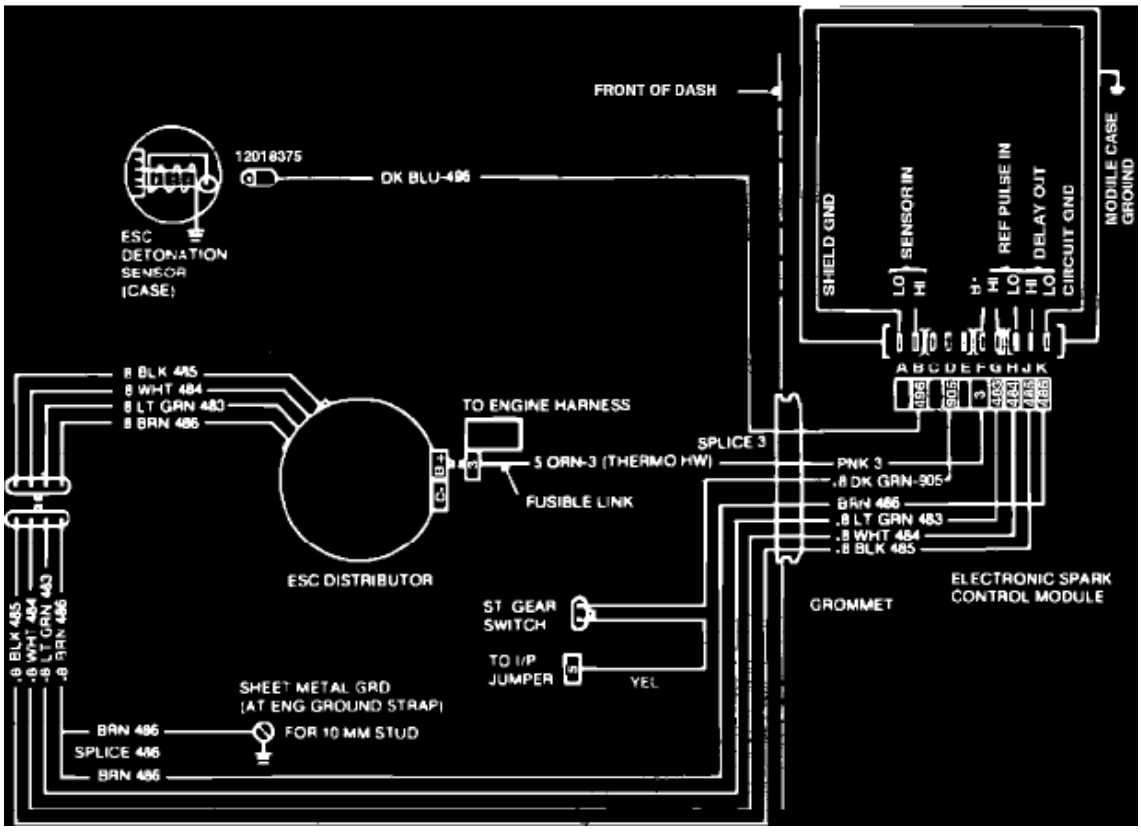


Fig. 47 Typical ESC Controller


FRONT OF DASH
12018375
DK BLU-496
ESC DETONATION SENSOR (CASE)
SHIELD GND
SENSOR IN
REF PULSE IN
DELAY OUT
CIRCUIT GND
MODULE CASE GROUND
A B C D E F G H J K
8 BLK 485
8 WHT 484
8 LT GRN 483
8 BRN 486
TO ENGINE HARNESS
SPLICE 3
5 ORN-3 (THERMO HW)
PNK 3
FUSIBLE LINE
BRN 486
8 LT GRN 483
8 WHT 484
8 BLK 485
ESC DISTRIBUTOR
GROMMET
ELECTRONIC SPARK CONTROL MODULE
SHEET METAL GRD (AT ENG GROUND STRAP)
BRN 486
FOR 10 MM STUD
SPLICE 486
BRN 486


FRONT OF DASH
12018375
DK BLU-496
ESC DETONATION SENSOR (CASE)
SHIELD GND
SENSOR IN
REF PULSE IN
DELAY OUT
CIRCUIT GND
MODULE CASE GROUND
A B C D E F G H J K
8 BLK 485
8 WHT 484
8 LT GRN 483
8 BRN 486
TO ENGINE HARNESS
SPLICE 3
5 ORN-3 (THERMO HW)
PNK 3
.8 DK GRN-905
FUSIBLE LINK
BRN 486
.8 LT GRN 483
.8 WHT 484
.8 BLK 485
ESC DISTRIBUTOR
ST GEAR SWITCH
TO I/P JUMPER
YEL
GROMMET
ELECTRONIC SPARK CONTROL MODULE
SHEET METAL GRD (AT ENG GROUND STRAP)
BRN 486
FOR 10 MM STUD
SPLICE 486
BRN 486

Electronic Spark Timing: Testing and Inspection

Use the following procedures to diagnose ESC system malfunctions only. To diagnose general ignition system malfunctions, refer to ``High Energy Ignition (HEI) System Diagnosis.''

Fig. 5 ESC system wiring schematic. 1984-86 models w/manual 4 speed top loader transmission

Fig. 6 ESC system wiring schematic. 1984-86 models w/manual 3 & 4 speed side loader transmission

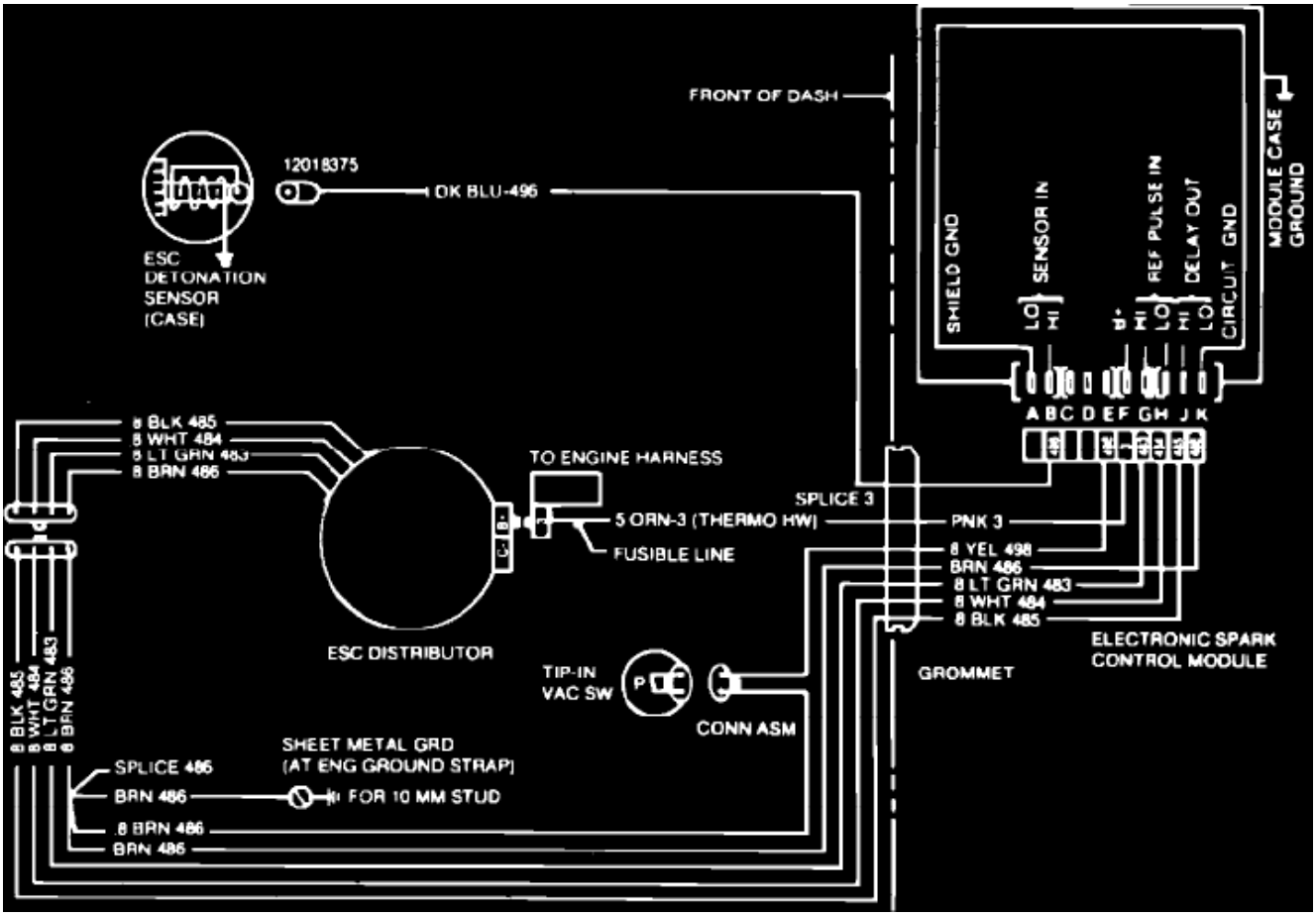


Fig. 7 ESC system wiring schematic. 1984-86 models w/auto. trans.

1984-86 MODELS

Engine Cranks But Will Not Start

1. Check for spark at at the ends of at least 2 spark plug wires using tester ST-125 or equivalent. If spark is observed, malfunction is not in ignition system.

2. If no spark is observed, disconnect 4 pin connector to distributor, connect jumper wire between pins A and C on distributor side of connector, Figs. 5, 6 and 7, and attempt to start engine. If engine starts, proceed to step 3. If engine does not start, proceed as follows:

a. Remove jumper wire and reconnect 4 pin connector to distributor. Turn on ignition and measure voltage at pins F and K of controller 10 pin

connector. If voltage is less than 11.6 volts, check feed circuit and repair as needed.

b. Set voltmeter on 2 volt scale and measure voltage between pins J and K of 10 pin connector while cranking engine. If reading is .75 volts or

greater, ESC system is satisfactory.

c. Set voltmeter on 2 volt scale and measure voltage between pins G and H of 10 pin connector while cranking engine. If reading is .20 volt or

greater, controller is defective. If reading is less than .20 volt, pole piece is defective.

3. Stop engine and remove jumper wire from distributor.

4. Connect suitable high resistance test lamp between distributor TACH terminal and ground, then turn on ignition. If test lamp lights, proceed to step 6.

5. If lamp does not light at TACH terminal, connect lamp between BAT terminal and ground and turn on ignition. If lamp does not light, repair feed circuit to ignition.

6. Crank engine with test lamp connected between distributor TACH terminal and ground. If test lamp flickers, system is satisfactory.

7. If test lamp does not flicker as engine is cranked, connect lamp between BAT terminal and pin A on distributor side of 4 pin ESC connector, then tap on coil. If coil makes a clicking noise when tapped, pole piece is defective.

8. If coil does not click, remove distributor cap an disconnect and reconnect pole piece electrical connector. If coil still does not click when tapped, ignition module is defective.

Poor Engine Performance

1. Disconnect distributor 4 pin connector, connect pins A and C on distributor side of connector with jumper wire, and road test vehicle.

2. If engine performance is still poor, cause is not in ESC system. If proper engine performance is restored by disconnecting ESC controller from distributor, remove jumper wire, reconnect 4 pin connector and proceed to next step.

3. Disconnect 10 pin connector from ESC controller, inspect terminals for proper contact, shots and opens, repair as needed, then recheck system operation.

4. If problem persists, disconnect 10 pin connector and measure resistance between pins B and K in connector. Reading should be 98-99 Kohms.

5. If resistance is not as specified, disconnect electrical connector from knock sensor and measure resistance between sensor terminal and ground. If resistance is 98-99 ohms, repair wiring between knock sensor and controller. If resistance is not 98-99 Kohms, knock sensor is defective.

6. Reconnect 10 pin connector to controller and measure voltage between pins F and K with ignition on. If voltage reading is less than 11.6 volts repair feed circuit as needed.

7. Set voltmeter on 20 volt AC scale and measure voltage between connector pins H and K with ignition on. If reading is less than .20 volt, inspect system wiring and repair as needed. If reading is greater than .20 volt, ensure all connectors are properly seated, then road test vehicle. If problem persists, replace ESC controller.

Engine Detonation

1. Inspect connector and wiring to knock sensor and repair as needed.

2. Connect suitable spark advance tester to engine, run engine until it reaches normal operating temperature and set engine to run at a minimum of 1200 RPM, then observe ignition timing while tapping on exhaust manifold. If ignition timing retards when manifold is tapped, ESC system is operating properly.

3. Stop engine, disconnect 10 pin connector from ESC controller and measure resistance between pins B and K of connector. If resistance is not 98-99 ohms, proceed to step 5.

4. Measure resistance between pins H and K in connector. If resistance is 14-16 ohms, replace controller. If resistance is not 14-16 ohms, repair wiring to controller.

5. Disconnect electrical connector from knock sensor and measure voltage at sensor terminal with engine running at 2000 RPM. If reading is not .08 volt or more, knock sensor is defective.

6. Stop engine. If knock sensor voltage output is satisfactory, check wiring between knock sensor and terminal B of controller and between controller terminal K and ground and repair as needed.

Engine Control Module: Technical Service Bulletins Engine Controls - Aftermarket Accessory Usage

INFORMATION

Bulletin No.: 04-06-04-054B

Date: November 18, 2010

Subject: Info - Non-GM Parts and Accessories (Aftermarket)

Models:

2011 and Prior GM Passenger Cars and Trucks

Supercede: This bulletin is being revised to add model years and update to the new U.S. Fixed Operation Manager (FOM) and Canada Warranty Manager (WM) names. Please discard Corporate Bulletin Number 04-06-04-054A (Section 06 - Engine/Propulsion System).

The recent rise and expansion of companies selling non-GM parts and accessories has made it necessary to issue this reminder to dealers regarding GM's policy on the use and installation of these aftermarket components.

When a dealer is performing a repair under the New Vehicle Limited Warranty, they are required to use only genuine GM or GM-approved parts and accessories. This applies to all warranty repairs, special policy repairs or any repairs paid for by GM. Parts and accessories advertised as being "the same" as parts manufactured by GM, but not sold through GM, do not qualify for use in warranty repairs, special policy repairs or any repairs paid for by GM.

During a warranty repair, if a GM original equipment part is not available through GM Customer Care and Aftersales (GM CC&A;), ACDelco(R) distributors, other GM dealers or approved sources, the dealer is to obtain comparable, non-GM parts and clearly indicate, in detail, on the repair order the circumstances surrounding why non-GM parts were used. The dealer must give customers written notice, prior to the sale or service, that such parts or accessories are not marketed or warranted by General Motors.

It should also be noted that dealers modifying new vehicles and installing equipment, parts and accessories obtained from sources not authorized by GM are responsible for complying with the National Traffic and Motor Vehicle Safety Act. Certain non-approved parts or assemblies, installed by the dealer or its agent not authorized by GM, may result in a change to the vehicle's design characteristics and may affect the vehicle's ability to conform to federal law. Dealers must fully understand that non-GM approved parts may not have been validated, tested or certified for use. This puts the dealer at risk for potential liability in the event of a part or vehicle failure. If a GM part failure occurs as the result of the installation or use of a non-GM approved part, the warranty will not be honored.

A good example of non-authorized modification of vehicles is the result of an ever increasing supply of aftermarket devices available to the customer, which claim to increase the horsepower and torque of the Duramax(TM) Diesel Engines. These include the addition of, but are not limited to one or more of the following modifications:

- Propane injection

- Nitrous oxide injection

- Additional modules (black boxes) that connect to the vehicle wiring systems

- Revised engine calibrations downloaded for the engine control module

- Calibration modules which connect to the vehicle diagnostic connector

- Modification to the engine turbocharger waste gate

Although the installation of these devices, or modification of vehicle components, can increase engine horsepower and torque, they may also negatively affect the engine emissions, reliability and/or durability. In addition, other powertrain components, such as transmissions, universal joints, drive shafts, and front/rear axle components, can be stressed beyond design safety limits by the installation of these devices.

General Motors does not support or endorse the use of devices or modifications that, when installed, increase the engine horsepower and torque. It is because of these unknown stresses, and the potential to alter reliability, durability and emissions performance, that GM has adopted a policy that prevents any UNAUTHORIZED dealer warranty claim submissions to any remaining warranty coverage, to the powertrain and driveline components whenever the presence of a non-GM (aftermarket) calibration is confirmed - even if the non-GM control module calibration is subsequently removed. Refer to the latest version of Bulletin 09-06-04-026 (V8 Gas Engines) or 06-06-01-007 (Duramax(TM) Diesel Engines) for more information on dealer requirements for calibration verification.

These same policies apply as they relate to the use of non-GM accessories. Damage or failure from the use or installation of a non-GM accessory will not be covered under warranty. Failure resulting from the alteration or modification of the vehicle, including the cutting, welding or disconnecting of the vehicle's original equipment parts and components will void the warranty.

Additionally, dealers will NOT be reimbursed or compensated by GM in the event of any legal inquiry at either the local, state or federal level that

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

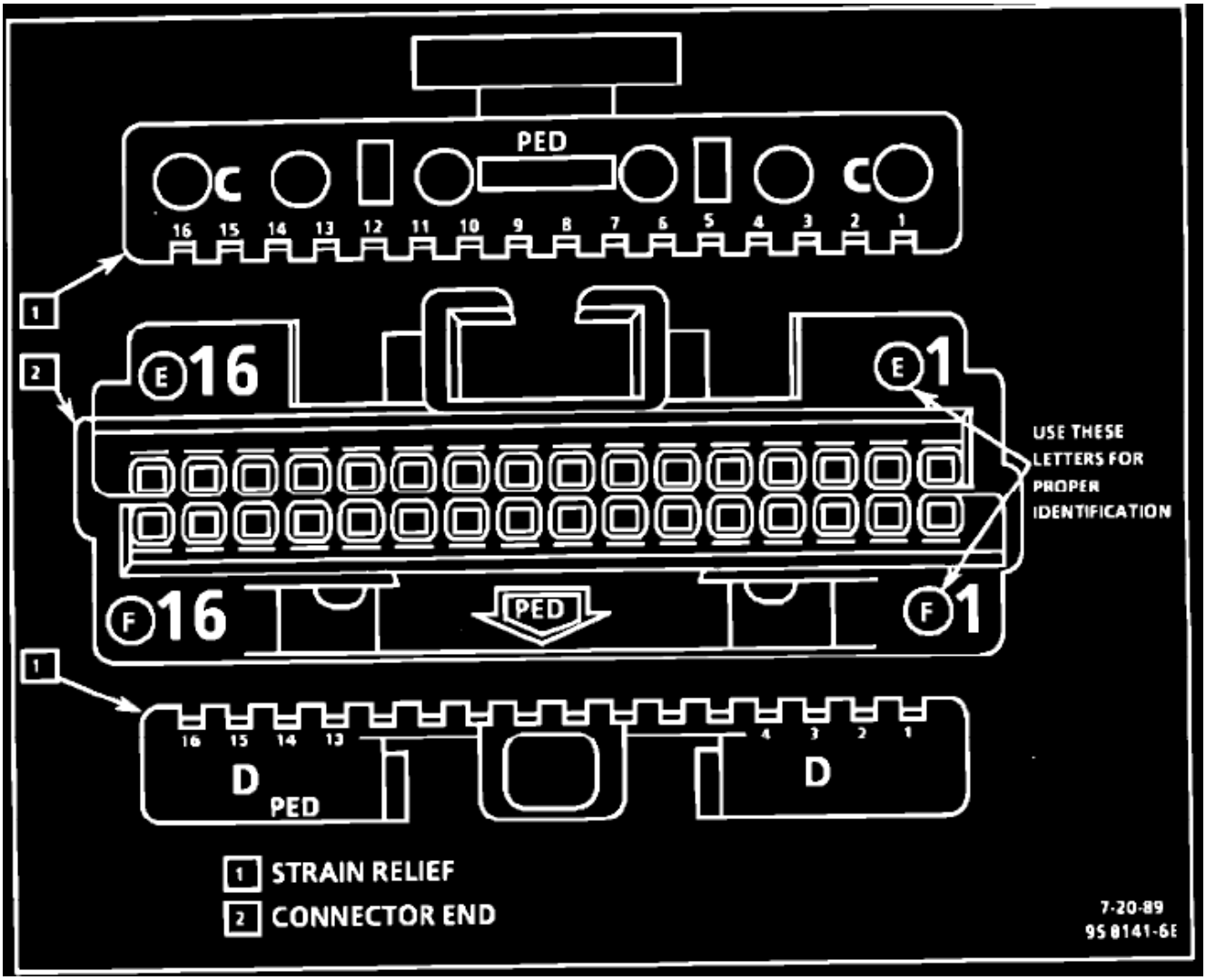
results from the alteration or modification of a vehicle using non-GM approved parts or accessories.

Dealers should be especially cautious of accessory companies that claim the installation of their product will not void the factory warranty. Many times these companies have even given direction on how to quickly disassemble the accessory in an attempt to preclude the manufacturer from finding out that is has been installed.

Any suspect repairs should be reviewed by the Fixed Operations Manager (FOM), and in Canada by the Warranty Manager (WM) for appropriate repair direction. If it is decided that a goodwill repair is to be made on the vehicle, even with the installation of such non-GM approved components, the customer is to be made aware of General Motors position on this issue and is to sign the appropriate goodwill documentation required by General Motors.

It is imperative for dealers to understand that by installing such devices, they are jeopardizing not only the warranty coverage, but also the performance and reliability of the customer's vehicle.

Disclaimer



Engine Control Module: Technical Service Bulletins ECM - Packard 32 Way Connector Identification

Number: 90-56-8

Section: 8

Date: September 1989

Corporate Bulletin No.: 916521R

Subject: PACKARD 32 WAY CONNECTOR IDENTIFICATION

Model and Year: 1980-90 A, B, F, G, J, L, W, Y CARS AND ALL TRUCKS WITH GMP4 ECM APPLICATIONS

TO: ALL CHEVROLET DEALERS

This bulletin serves to clarify the labeling of the Packard 32 way connectors used on the GMP4 under dash ECMS.

Currently a common strain relief is used in both the C-D 32 pin and the E-F 32 pin connectors. To properly identify these connectors, the strain reliefs must be removed. Use the lettering on the connector as shown on figure.

The colors used at this time for the 32 pin E-F connector are yellow, mint green or orange.

This updates any previous information released concerning identification that indicates any of these colors as being C & D connectors, found in the 6E and 8D Sections of the affected Service Manuals.

Engine Control Module: Technical Service Bulletins ECM/PCM - Damaged and/or Misdiagnosed

Number: 91-384-6E

Section: 6E

Date: AUGUST 1991

Corporate Bulletin No.: 176503

Subject: DAMAGED ECM/PCM AND/OR MIS-DIAGNOSED ECM/PCM SYMPTOMS DUE TO INCORRECT "TAP-TESTING" PROCEDURES

Model and Year: 1982-91 ALL PASSENGER CARS AND TRUCKS

CONDITION: Because of the intermittent nature of some Electronic Control Module (ECM) or Powertrain Control Modules (PCM) symptoms, some service technicians have been subjecting the ECM/PCM to vibration and/or shock testing. Commonly known as tap-testing, this procedure involves tapping on the ECM/PCM case, while the engine is running. It is generally accepted that if the engine or ECM/PCM falters due to the tapping, an intermittent internal ECM/PCM defect may be indicated. However, this may not always be true. If too much force is applied to the ECM/PCM during the test the following symptoms may result:

^ Immediate ECM/PCM failure.

^ ECM/PCM suffers damage which may cause a failure at a later date.

^ ECM/PCM Reset (or Glitch), creating a momentary stall, miss Service Engine Soon (SES) light and/or loss of serial data.

CAUSE: The ECM/PCM should be tapped using only the fingertips of one hand. Use of the palm, fist, or any type of tool subjects the ECM/PCM to forces that can cause both the circuit board and the outer aluminum case to flex and distort beyond design limits. The Integrated Circuits (IC) used in today's ECM/PCMs are mounted to the circuit board using a mounting process referred to as "surface technology." There are no circuit board holes for IC leads to go through. The IC leads set on pads, (28 pads or 52 pads depending on the IC) and solder is flowed around the leads to make the electrical connection to the circuit board.

^ Any flexing of the circuit board, beyond design limits, places the IC solder connections at risk of damage. Such damage may be apparent immediately, or it may appear at a future date. Circuit board deflection can occur as a result of striking the ECM/PCM, using ONLY THE PALM OF THE HAND.

^ If struck on the bottom side (the side opposite the service label), the ECM/PCM's aluminum outer case may deflect inward far enough to contact the electrical leads attached to the circuit board. Once in contact with the case the ECM/PCM electrical components will be shorted directly to ground. Although such shorting certainly has the potential to damage the ECM/PCM, it may not be permanent damage, depending on which circuit is involved. However, even if permanent damage is avoided, a short on any of the circuits will cause a disruption of normal ECM/PCM operation for the instant that the short occurs. This disruption may cause the ECM/PCM to reset (see "reset" above), creating the false impression that it is vibration sensitive or faulty. Reset is the ECM/PCM's normal way of coping with large voltage spikes. An ECM/PCM reset does not indicate that the ECM/PCM is defective or faulty, only that it is being subjected to abnormal conditions.

CORRECTION:

1. TAP THE ECM/PCM ONLY ON THE TOP SIDE (The top side is where the service label is located.)

^ This will minimize the chance of deflecting the ECM/PCM case into the electrical leads on the circuit board. The clearance between the case and the circuit board is closest on the bottom side of the ECM/PCM.

2. TAP THE ECM/PCM USING ONLY THE FINGERTIPS - NO TOOLS.

^ To avoid excessive case deflection, avoid tapping in the center of the case. Tapping close to the edge of the ECM/PCM, especially in the corners, is best.

^ While using greater force may seem more effective, the test itself may cause the ECM/PCM to fail.

Engine Control Module: Technical Service Bulletins Engine Controls - ECM May Contain Wrong PROM

Number: 88-42

Section: 6E

Date: Sept., 1987

Subject: SERVICE REPLACEMENT ELECTRONIC MODULES (ECM) WITH PROM INSTALLED

Model and Year: 1981-88 ALL MODELS TO:

ALL CHEVROLET DEALERS

It has been brought to our attention that some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM for the vehicle.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

Engine Control Module: Technical Service Bulletins ECM - Revised Replacement Procedure

Number: 87-150

Section: 6E

Date: MAY, 1987

Subject: REVISED ECM REPLACEMENT PROCEDURE - CHART C-1

Model and Year: 1982 THROUGH 1987 ECM EQUIPPED VEHICLES

TO: ALL CHEVROLET DEALERS

The purpose of this bulletin is to introduce new ECM test procedures to reduce the possibility of multiple ECM failures on any one vehicle.

Since 1982, most ECM's have used an integrated circuit (IC) in place of separate transistors to turn "on" or "off" different components controlled by the ECM. These IC's are called quad drivers (QDR). Each QDR has four separate outputs, meaning it can turn "on" or "off" four different items independently.

A failed QDR usually results in an ECM output becoming either shorted to ground or open. Many times all four QDR output will be inoperative if just one vehicle circuit is faulty.

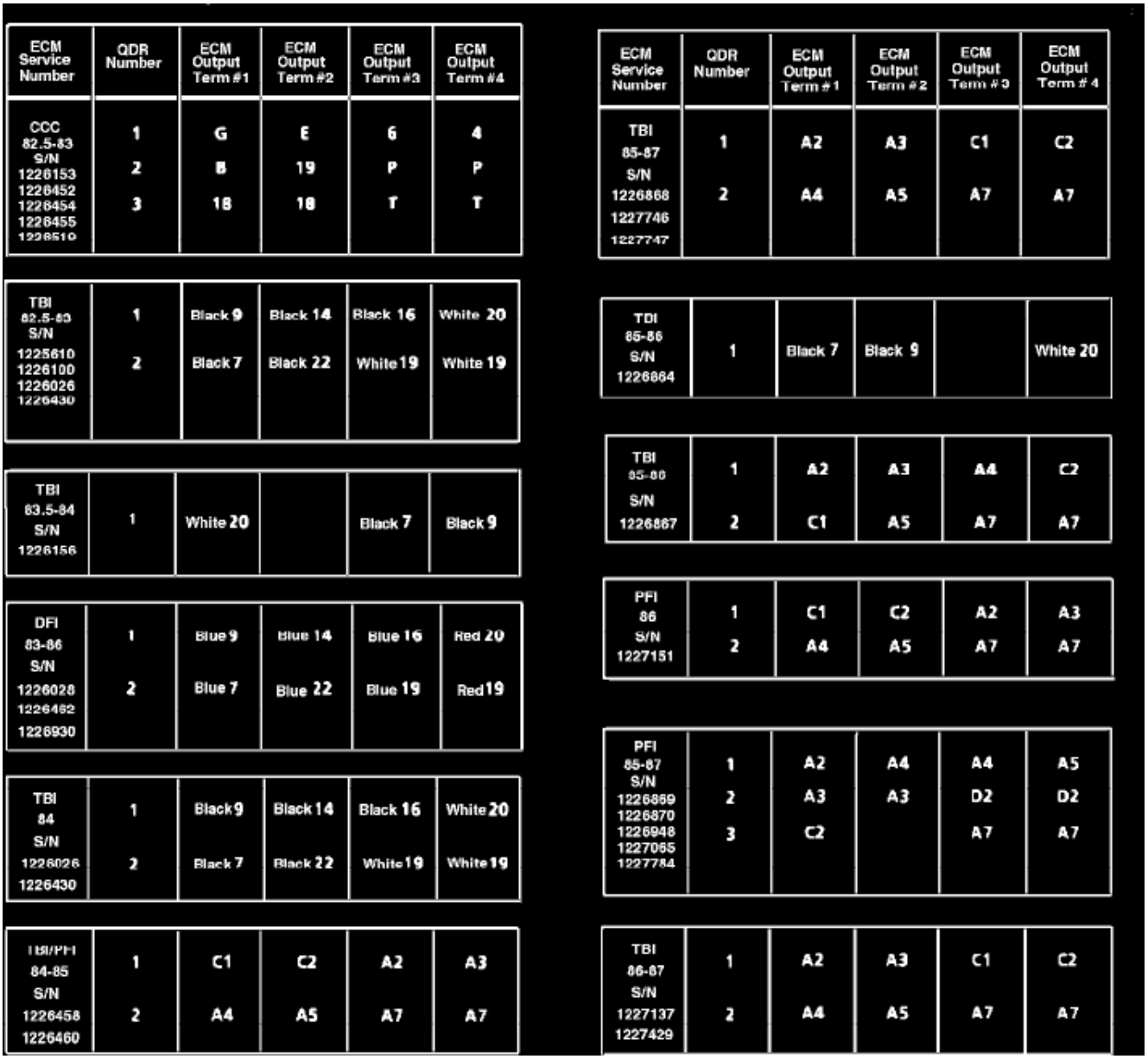
The revised diagnosis incorporates new test procedures designed to identify a damaged QDR. Once identified, the circuit must be repaired to reduce the incidence of repeat ECM failures.

This chart replaces the current service manual procedure for either:

1. Chart C-1 ECM replacement check, or

2. Any diagnostic chart where "replace ECM" is the conclusion, especially if a footnote indicates checking certain circuits for less than 20 OHM's resistance.

It is strongly suggested that this chart be used whenever an ECM replacement is indicated for 1982 through 1987 vehicles.



ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
CCC 82.5-83 S/N 1226153 1226452 1226454 1226455 1226510	1	G	E	6	4
	2	B	19	P	P
	3	18	18	T	T

ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
TBI 85-87 S/N 1226868 1227746 1227747	1	A2	A3	C1	C2
	2	A4	A5	A7	A7

TBI 82.5-83 S/N 1225610 1226100 1226026 1226430	1	Black 9	Black 14	Black 16	White 20
	2	Black 7	Black 22	White 19	White 19

TDI 85-86 S/N 1226864	1	Black 7	Black 9		White 20

TBI 83.5-84 S/N 1226156	1	White 20		Black 7	Black 9

TBI 85-86 S/N 1226867	1	A2	A3	A4	C2
	2	C1	A5	A7	A7

DFI 83-86 S/N 1226028 1226462 1226930	1	Blue 9	Blue 14	Blue 16	Red 20
	2	Blue 7	Blue 22	Blue 19	Red 19

PFI 86 S/N 1227151	1	C1	C2	A2	A3
	2	A4	A5	A7	A7

TBI 84 S/N 1226026 1226430	1	Black 9	Black 14	Black 16	White 20
	2	Black 7	Black 22	White 19	White 19

PFI 85-87 S/N 1226869 1226870 1226948 1227065 1227784	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	C2		A7	A7

TBI/PFI 84-85 S/N 1226458 1226460	1	C1	C2	A2	A3
	2	A4	A5	A7	A7

TBI 86-87 S/N 1227137 1227429	1	A2	A3	C1	C2
	2	A4	A5	A7	A7

QDR Application Chart

QDR Application Chart For CHART C-1

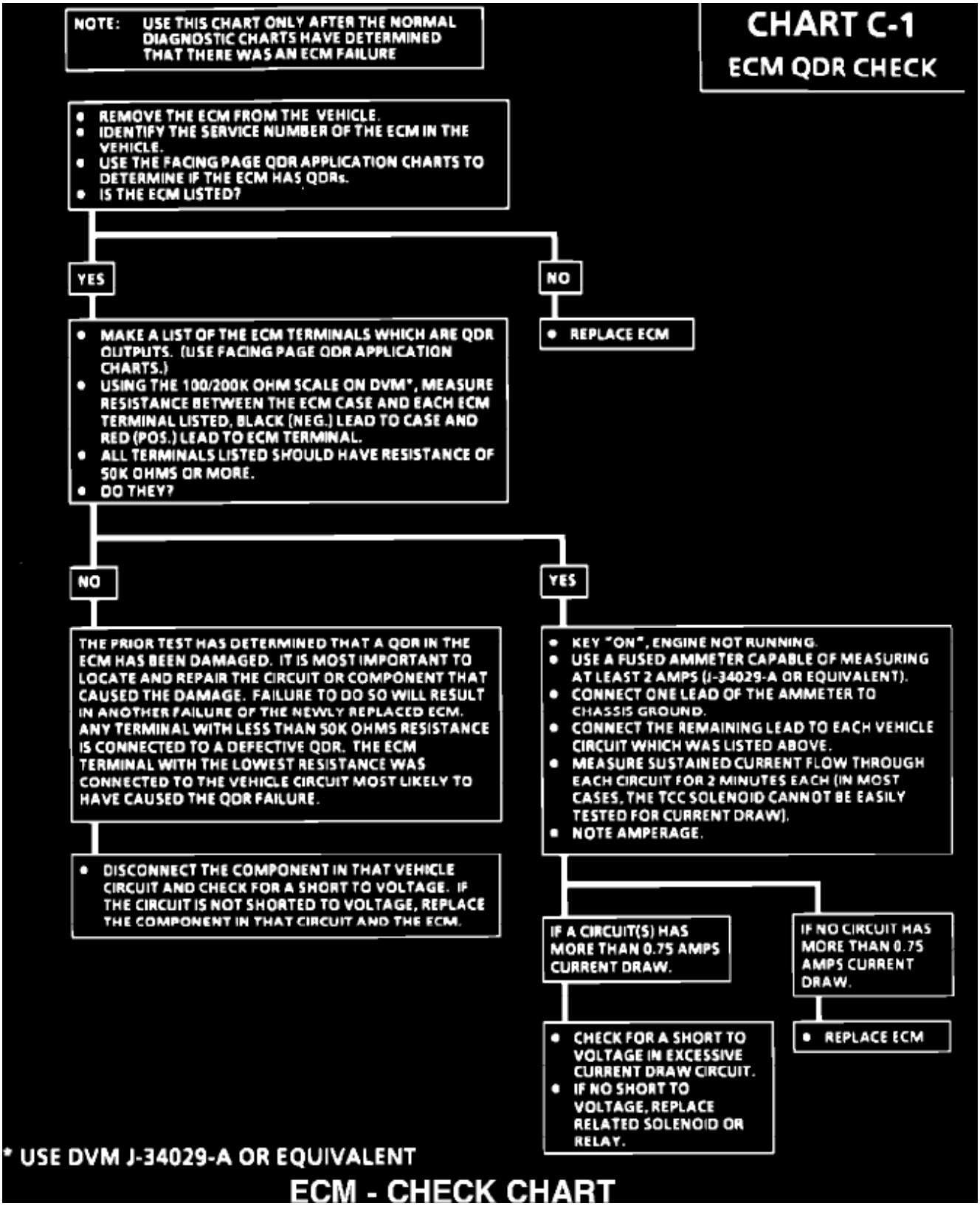
The following chart contains ECM QDR arrangement for all ECM models thru 1987.* Important Note:

^ Many 82-83 ECMs did not use QDRs, and will not appear on the chart.

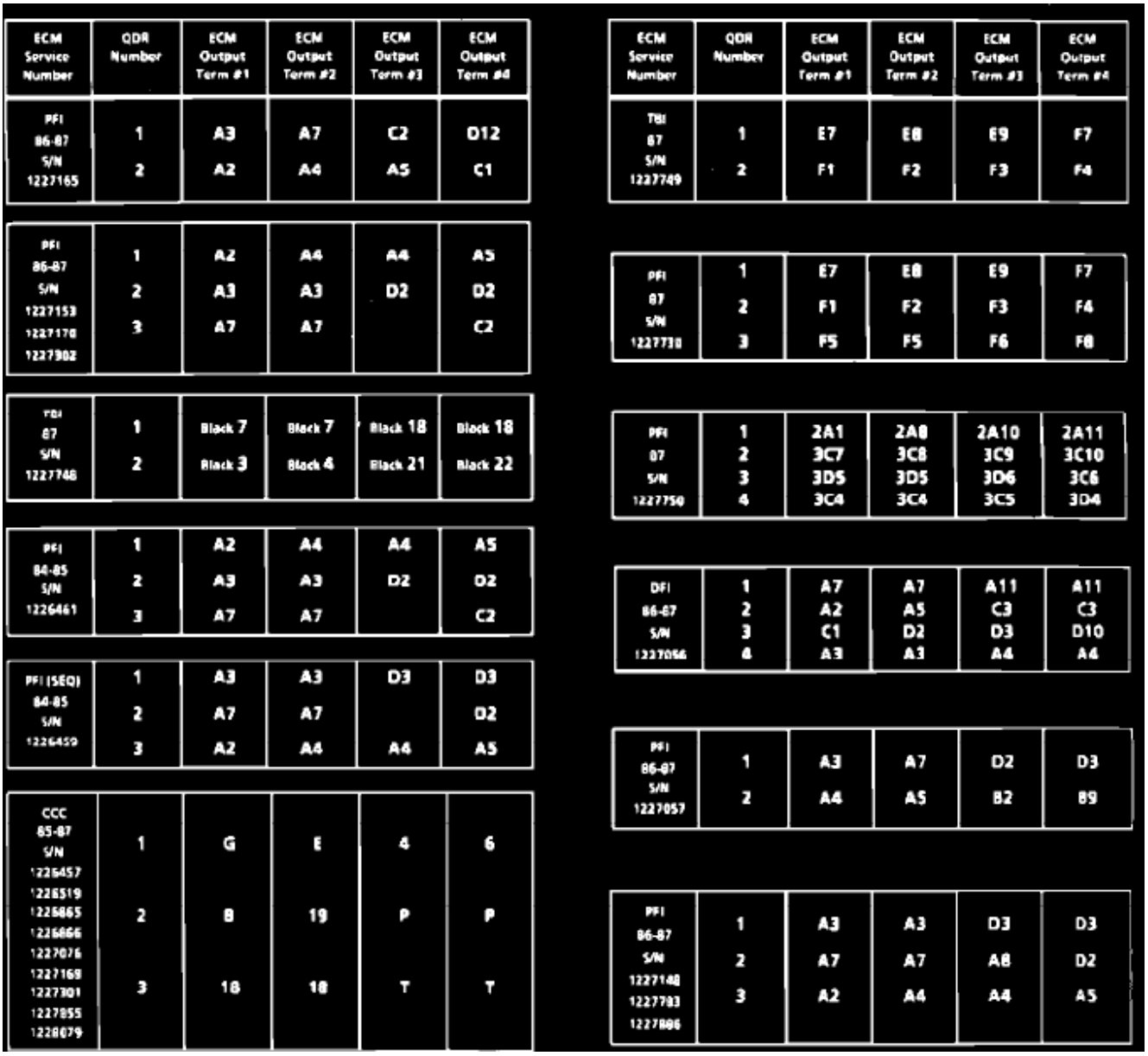
^ This procedure will not work on any ECM Service Number which does not appear on the chart. (This is because such an ECM does not contain QDRs.)

^ Not all available QDR outputs are used for ECM application. Verify circuit usage from the ECM wiring diagrams for each specific engine using Section "6E" of the service manual.

*Additional ECMs listed on page 4



ECM - CHECK CHART



ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
PFI 86-87 S/N 1227165	1	A3	A7	C2	D12
	2	A2	A4	A5	C1
PFI 86-87 S/N 1227153 1227170 1227902	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	A7	A7		C2
TBI 87 S/N 1227748	1	Black 7	Black 7	Black 18	Black 18
	2	Black 3	Black 4	Black 21	Black 22
PFI 84-85 S/N 1226461	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	A7	A7		C2
PFI (SEQ) 84-85 S/N 1226459	1	A3	A3	D3	D3
	2	A7	A7		D2
	3	A2	A4	A4	A5
CCC 85-87 S/N 1226457 1226519 1226865 1226866 1227076 1227169 1227301 1227855 1228079	1	G	E	4	6
	2	B	19	P	P
	3	18	18	T	T

ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
TBI 87 S/N 1227749	1	E7	E8	E9	F7
	2	F1	F2	F3	F4
PFI 87 S/N 1227730	1	E7	E8	E9	F7
	2	F1	F2	F3	F4
	3	F5	F5	F6	F8
PFI 87 S/N 1227750	1	2A1	2A8	2A10	2A11
	2	3C7	3C8	3C9	3C10
	3	3D5	3D5	3D6	3C6
	4	3C4	3C4	3C5	3D4
DFI 86-87 S/N 1227056	1	A7	A7	A11	A11
	2	A2	A5	C3	C3
	3	C1	D2	D3	D10
	4	A3	A3	A4	A4
PFI 86-87 S/N 1227057	1	A3	A7	D2	D3
	2	A4	A5	B2	B9
PFI 86-87 S/N 1227148 1227783 1227806	1	A3	A3	D3	D3
	2	A7	A7	A8	D2
	3	A2	A4	A4	A5

QDR APPLICATION CHART

QDR Application Chart For CHART C-1

The following chart contains ECM QDR arrangement for all ECM models thru 1987. Important Note:

^ Many 82-83 ECMs did not use QDRs, and will not appear on the chart.

^ This procedure will not work on any ECM Service Number which does not appear on the chart. (This is because such an ECM does not contain QDRs.)

^ Not all available QDR outputs are used for ECM application. Verify circuit usage from the ECM wiring diagrams for each specific engine using Section "6E" of the service manual.

ECM TERMINAL VOLTAGE

THIS ECM VOLTAGE CHART IS FOR USE WITH DIGITAL VOLTMETER TO FURTHER AID IN DIAGNOSIS. THESE VOLTAGES WERE DERIVED FROM A KNOWN GOOD VEHICLE. THE VOLTAGES YOU GET MAY VARY DUE TO LOW BATTERY CHARGE OR OTHER REASONS, BUT THEY SHOULD BE VERY CLOSE.

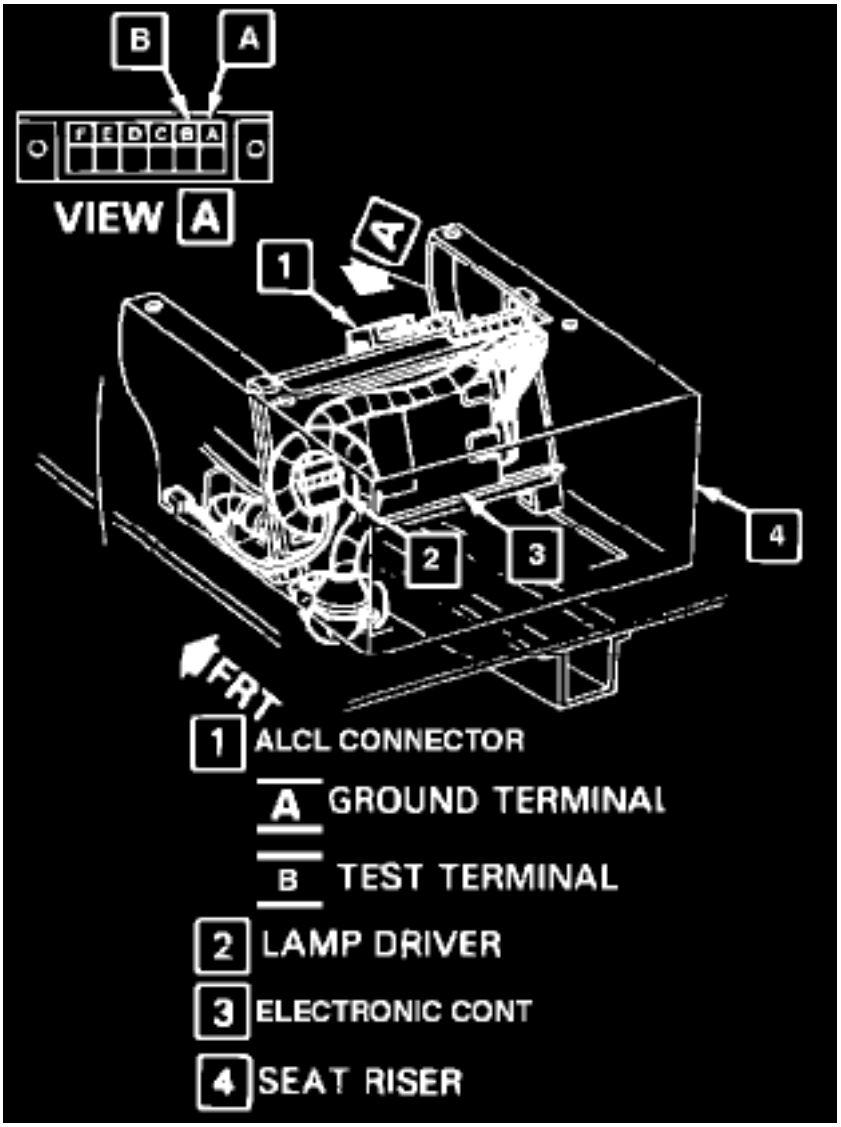
THE FOLLOWING CONDITIONS MUST BE MET BEFORE TESTING:

- ENGINE AT OPERATING TEMPERATURE
- CLOSED LOOP (ENGINE AT 1000 RPM)
- ENGINE AT 1000 RPM (FOR "ENGINE RUN" COLUMN)
- TEST TERMINAL NOT GROUNDED
- SCANNER NOT INSTALLED
- 2 WD

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open						Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open
0	0	0	SENSOR RETURN	22	1		NOT USED			
5	5	5	5V REFERENCE	21	2		TPS SENSOR SIGNAL	*1.0 +5.0	*2.0	5.0
.5-.65	2-3	*.5	VACUUM SENSOR SIGNAL	20	3		COOLANT TEMP. SENSOR SIGNAL	*3.0	*2.5	5.0
12	14	*.5	EGR	19	4		NOT USED			
12	5-10 (var.)	*.5	M/C SOLENOID	18	5		DIAGNOSTIC TEST TERM	5	5	5
			NOT USED	17	6		NOT USED			
			NOT USED	16	7		COOLANT TEMP. SENSOR RETURN	0	0	0
			NOT USED	15	8		NOT USED			
*.5	*.5	1.7	OXYGEN SENSOR – LO	14	9		OXYGEN SENSOR – HI	.3-.45	.1-.9 (var.)	.3-.45
*.5	*.5	*1.0	DIST. REF. PULSE – LO	13	10		DIST. REF. PULSE – HI	*.5	1-2 (var.)	*.5
*.5	1-2 (var.)	*.5	EST	12	11		IGN. MODULE BY-PASS	*.5	3.7	*.5
			NOT USED	J	K		NOT USED			
			NOT USED	H	L		NOT USED			
10	*.5	*.5	"CHECK ENGINE" LAMP	G	M		NOT USED			
			NOT USED	F	N		4TH GEAR SWITCH	*.5	*.5	12
			NOT USED	E	P		TRANS CONVERTER CLUTCH SOLENOID	12	14	*.5
			NOT USED	D	R		TROUBLE CODE MEMORY POWER	12	14	*.5
12	14	*.5	IGN. 1 POWER	C	S		NOT USED			
12	.14	*.5	AIR DIVERT SOLENOID	B	T		PURGE	12	.12	*.5
0	0	0	GROUND (TO ENGINE)	A	U		GROUND (TO ENGINE)	0	0	0

* = Value Shown or Less Than that Value
† = Wide Open Throttle
(var.) = variable

ECM Terminal Identification & Voltage Specifications



Electronic Control Module

ECM TERMINAL VOLTAGE

THIS ECM VOLTAGE CHART IS FOR USE WITH DIGITAL VOLTMETER TO FURTHER AID IN DIAGNOSIS. THESE VOLTAGES WERE DERIVED FROM A KNOWN GOOD VEHICLE. THE VOLTAGES YOU GET MAY VARY DUE TO LOW BATTERY CHARGE OR OTHER REASONS, BUT THEY SHOULD BE VERY CLOSE.

THE FOLLOWING CONDITIONS MUST BE MET BEFORE TESTING:

- ENGINE AT OPERATING TEMPERATURE
- CLOSED LOOP (ENGINE AT 1000 RPM)
- ENGINE AT 1000 RPM (FOR "ENGINE RUN" COLUMN)
- TEST TERMINAL NOT GROUNDED
- SCANNER NOT INSTALLED
- 2 WD

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open						Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open
0	0	0	SENSOR RETURN	22	1		NOT USED			
5	5	5	5V REFERENCE	21	2		TPS SENSOR SIGNAL	*1.0 +5.0	*2.0	5.0
.5-.65	2-3	*.5	VACUUM SENSOR SIGNAL	20	3		COOLANT TEMP. SENSOR SIGNAL	*3.0	*2.5	5.0
12	14	*.5	EGR	19	4		NOT USED			
12	5-10 (var.)	*.5	M/C SOLENOID	18	5		DIAGNOSTIC TEST TERM	5	5	5
			NOT USED	17	6		NOT USED			
			NOT USED	16	7		COOLANT TEMP. SENSOR RETURN	0	0	0
			NOT USED	15	8		NOT USED			
*.5	*.5	1.7	OXYGEN SENSOR – LO	14	9		OXYGEN SENSOR – HI	.3-.45	.1-.9 (var.)	.3-.45
*.5	*.5	*1.0	DIST. REF. PULSE – LO	13	10		DIST. REF. PULSE – HI	*.5	1-2 (var.)	*.5
*.5	1-2 (var.)	*.5	EST	12	11		IGN. MODULE BY-PASS	*.5	3.7	*.5
			NOT USED	J	K		NOT USED			
			NOT USED	H	L		NOT USED			
10	*.5	*.5	"CHECK ENGINE" LAMP	G	M		NOT USED			
			NOT USED	F	N		4TH GEAR SWITCH	*.5	*.5	12
			NOT USED	E	P		TRANS CONVERTER CLUTCH SOLENOID	12	14	*.5
			NOT USED	D	R		TROUBLE CODE MEMORY POWER	12	14	*.5
12	14	*.5	IGN. 1 POWER	C	S		NOT USED			
12	.14	*.5	AIR DIVERT SOLENOID	B	T		PURGE	12	.12	*.5
0	0	0	GROUND (TO ENGINE)	A	U		GROUND (TO ENGINE)	0	0	0

* = Value Shown or Less Than that Value
† = Wide Open Throttle
(var.) = variable

ECM Terminal Identification & Voltage Specifications

Engine Control Module: Description and Operation "E" Cell

The ``E'' cell controls voltage at ECM terminal 15. For the first 25,000 miles of vehicle operation, voltage is nearly zero. The ``E'' cell then causes voltage to rise to approximately 5 volts. This provides a different control value for some systems.

Engine Control Module: Description and Operation Electronic Spark Timing (EST)

Electronic Spark Timing is used on all Calif. vehicles. The EST distributor contains no centrifugal or vacuum advance and uses a seven terminal High Energy Ignition (HEI) module. A four-terminal connector is used for EST use, in addition to the connectors normally found on HEI distributors. All spark timing changes are controlled by the ECM, which monitors information from the various engine sensors, computes the correct spark timing, then signals the distributor to adjust the timing accordingly. The distributor operates without ECM control during cranking or when setting basic ignition timing. This is known as the ``Bypass'' mode and it is determined by the bypass lead from the ECM to the distributor. When the bypass lead voltage is 5 volts, the ECM performs the spark timing function. However, when the bypass lead is grounded or open circuited, the HEI module assumes the spark control function. Disconnecting the four-terminal EST connector causes the engine to automatically operate in the bypass mode. The EST connector should be disconnected whenever setting basic ignition timing.

Engine Control Module: Description and Operation General System Description

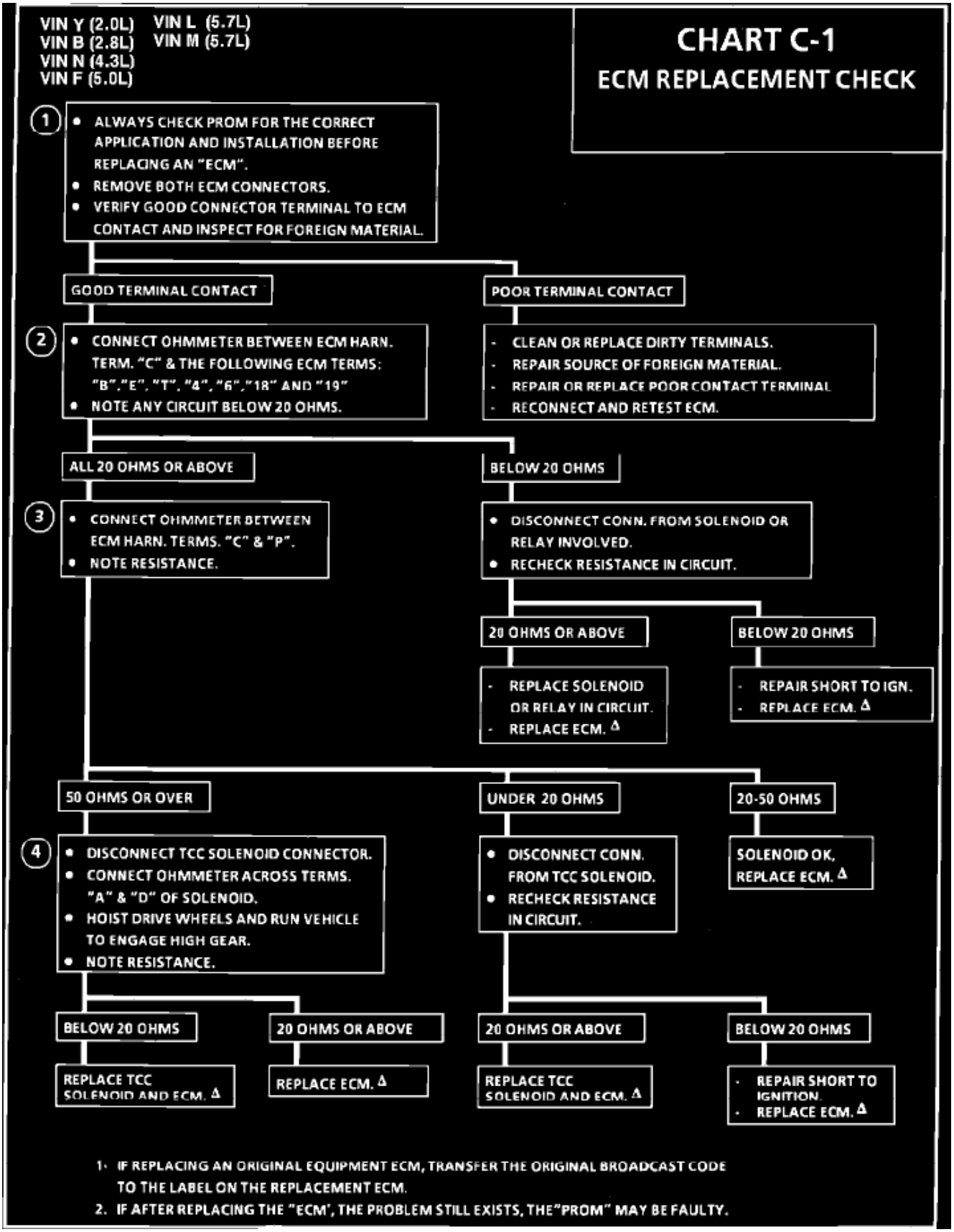
The ECM is the control center of the C3 system. Its function is to monitor input information from the various sensors, process this information, then generate output commands to the various systems that affect the performance of the vehicle. The ability of the ECM to perform these functions is dependent upon a removable calibration unit called the PROM. There are specific ECM/PROM combinations for each vehicle and they should not be interchanged. The ECM also performs the diagnostic function of the C3 system, alerting the driver through a ``Check Engine'' light should any problem in the system arise and storing a code or series of codes which the technician uses as an aid in making repairs.

Engine Control Module: Description and Operation Trouble Code Memory

The ECM is capable of sensing certain system malfunctions, storing data related to these malfunctions in the trouble code memory and alerting the operator of the malfunctions through the instrument panel mounted "Check Engine" lamp. If a system malfunction occurs while the engine is running, the ``Check Engine'' lamp will light and a trouble code will be stored in the ECM memory. The lamp will remain on with the engine running until malfunction is corrected. If the malfunction is intermittent, the lamp will go out but the code will remain stored in the trouble code memory.

Engine Control Module: Diagnostic Trouble Code Descriptions

For information regarding B, C, P, U and Manufacturer Code Descriptions -

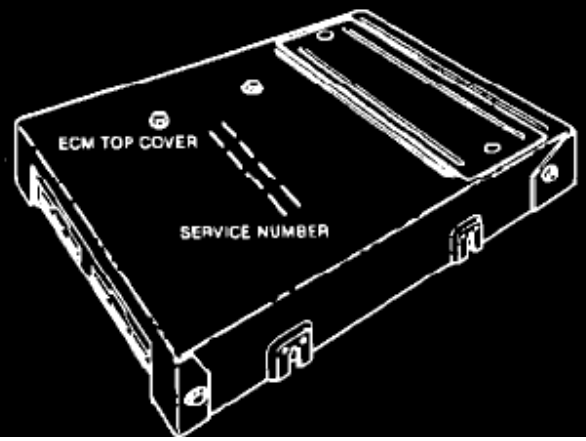

VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART C-1
ECM REPLACEMENT CHECK
1
• ALWAYS CHECK PROM FOR THE CORRECT APPLICATION AND INSTALLATION BEFORE REPLACING AN "ECM".
• REMOVE BOTH ECM CONNECTORS.
• VERIFY GOOD CONNECTOR TERMINAL TO ECM CONTACT AND INSPECT FOR FOREIGN MATERIAL.
GOOD TERMINAL CONTACT
POOR TERMINAL CONTACT
2
• CONNECT OHMMETER BETWEEN ECM HARN. TERM. "C" & THE FOLLOWING ECM TERMS: "B", "E", "T", "4", "6", "18" AND "19"
• NOTE ANY CIRCUIT BELOW 20 OHMS.
- CLEAN OR REPLACE DIRTY TERMINALS.
- REPAIR SOURCE OF FOREIGN MATERIAL.
- REPAIR OR REPLACE POOR CONTACT TERMINAL
- RECONNECT AND RETEST ECM.
ALL 20 OHMS OR ABOVE
BELOW 20 OHMS
3
• CONNECT OHMMETER BETWEEN ECM HARN. TERMS. "C" & "P".
• NOTE RESISTANCE.
• DISCONNECT CONN. FROM SOLENOID OR RELAY INVOLVED.
• RECHECK RESISTANCE IN CIRCUIT.
20 OHMS OR ABOVE
BELOW 20 OHMS
- REPLACE SOLENOID OR RELAY IN CIRCUIT.
- REPLACE ECM. Δ
- REPAIR SHORT TO IGN.
- REPLACE ECM. Δ
50 OHMS OR OVER
UNDER 20 OHMS
20-50 OHMS
4
• DISCONNECT TCC SOLENOID CONNECTOR.
• CONNECT OHMMETER ACROSS TERMS. "A" & "D" OF SOLENOID.
• HOIST DRIVE WHEELS AND RUN VEHICLE TO ENGAGE HIGH GEAR.
• NOTE RESISTANCE.
• DISCONNECT CONN. FROM TCC SOLENOID.
• RECHECK RESISTANCE IN CIRCUIT.
SOLENOID OK, REPLACE ECM. Δ
BELOW 20 OHMS
20 OHMS OR ABOVE
20 OHMS OR ABOVE
BELOW 20 OHMS
REPLACE TCC SOLENOID AND ECM. Δ
REPLACE ECM. Δ
REPLACE TCC SOLENOID AND ECM. Δ
- REPAIR SHORT TO IGNITION.
- REPLACE ECM. Δ
1. IF REPLACING AN ORIGINAL EQUIPMENT ECM, TRANSFER THE ORIGINAL BROADCAST CODE TO THE LABEL ON THE REPLACEMENT ECM.
2. IF AFTER REPLACING THE "ECM", THE PROBLEM STILL EXISTS, THE "PROM" MAY BE FAULTY.

Engine Control Module: Component Tests and General Diagnostics

Chart C-1 - ECM Replacement Check

Remove or Disconnect (Figures 1 and 2)

1. New electronic control module out of its packaging and check the service number to make sure it is the same as the faulty ECM.
2. Access cover so that PROM from faulty ECM may be installed in replacement ECM.



Important

REPLACEMENT ELECTRONIC CONTROL MODULE (ECM) IS SUPPLIED WITHOUT AN ENGINE CALIBRATION UNIT (PROM) SO CARE SHOULD BE TAKEN WHEN REMOVING THE PROM FROM THE DEFECTIVE ECM AS IT WILL BE REUSED IN THE NEW ECM. REFER TO PROM REPLACEMENT PROCEDURE AS DETAILED IN CODE 51.

ECM Replacement Check for Chart C-1

CHART C-1 - ECM REPLACEMENT CHECK

Circuit Description: Prior to replacing an ECM, the circuit involved must be tested for:

^ Poor connector terminal to ECM contact;

^ Direct battery voltage on an ECM ground circuit from a short to B+; or

^ Shorted solenoid or relay. If a short is found, the circuit must be repaired prior to replacing the ECM to prevent repeat ECM failures

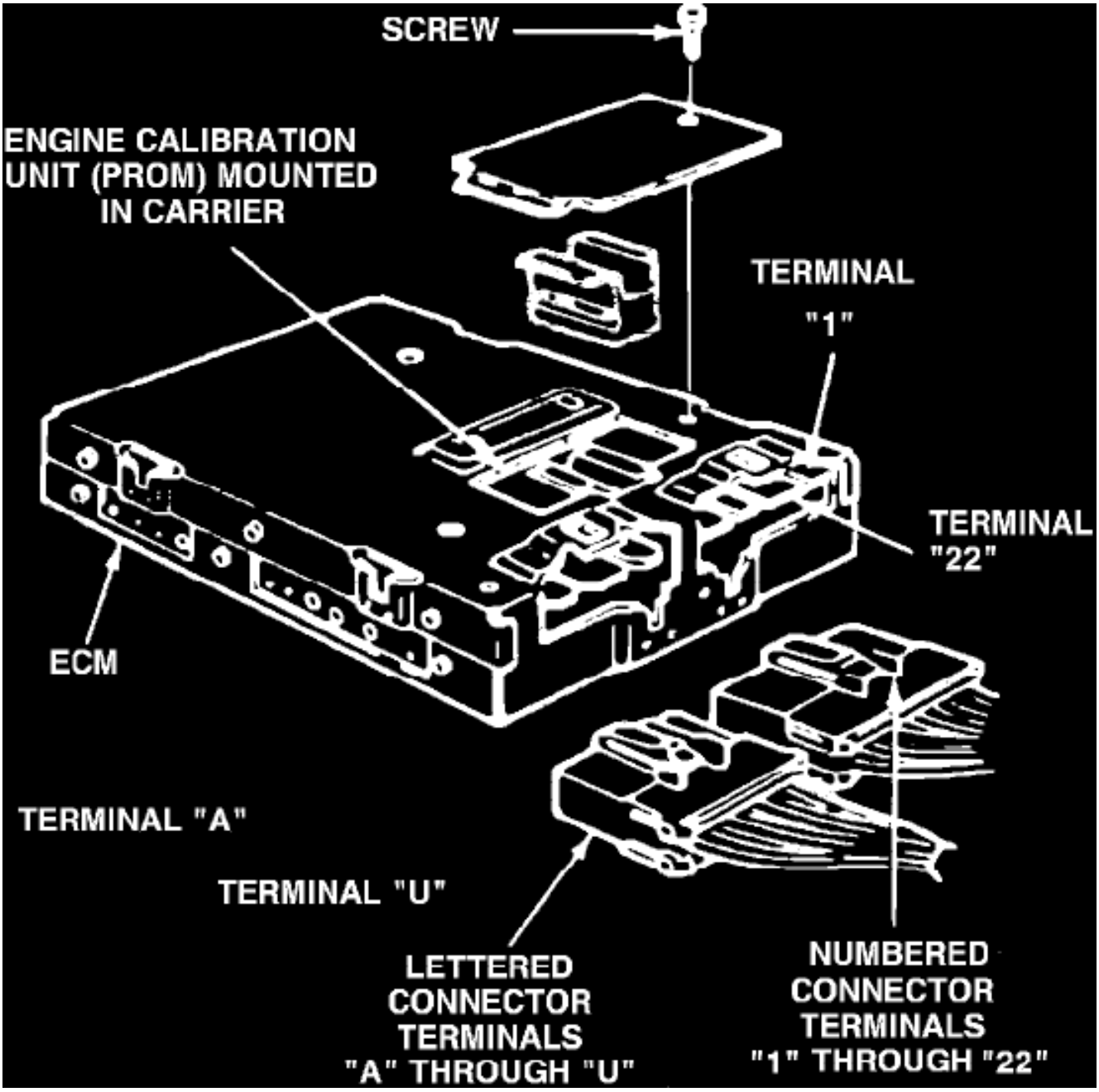
Test Description:

1. Check for good terminal contact due to weak or dirty terminals. Remove terminal to inspect. Replace if broken or dirty. If coolant is present, replace coolant sensor and connector. Also, replace ECM connector terminal and blow coolant out of harness. Clean connector with alcohol or spray contact cleaner and replace ECM.

2. Check for a short to ignition or shorted solenoid or relay. All terminals must be tested since several are connected internally in the ECM. A short in one circuit may cause another circuit in the ECM to be inoperative that does not have an external fault, but was the cause of "driver's complaint." Any circuit testing below 20 ohms is shorted to ignition, or shorted across the relay or solenoid.

3. Check for shorted TCC solenoid. Some transmissions have a normally open 4th gear switch in series with the solenoid. The ohmmeter will read infinite resistance (open circuit) in these cases. If the reading is less than 20 ohms, a short to ignition or faulty solenoid exists. A normal solenoid will read between 20 - 50 ohms.

4. Check for shorted TCC circuit in units with a 4th gear switch. The vehicle must be in 4th gear to close the switch to obtain a resistance reading. A normal solenoid will read between 20-50 ohms.



Engine Control Module: Service and Repair

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB #88-42, DATED 09/87

Some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB #88-283-6E, DATED 7/88

To prevent possible electrostatic discharge damage to electrical components:

-Do not touch the ECM connector pins or soldered components on the circuit board. -When handling a PROM, CAL-PAK or MEM-CAL, do not touch the component leads and do not remove integrated circuit from carrier.

Fig. 249 Electronic Control Module (ECM)

1. Disconnect battery ground cable.

2. Disconnect numbered and lettered connectors from ECM, Fig. 249.

3. Remove ECM mounting hardware, then the ECM from the passenger compartment.

4. Reverse procedure to install. Replacement Electronic Control Modules are not equipped with engine calibration units (PROM). If PROM is to be reused, care should be taken when removing it from defective ECM. See ``Prom, Replace'' for proper removal procedure.

Engine Speed Signal: Description and Operation

On all models with full function systems except V6-229 (1983 - 84 VIN code 9) engines, the ``R'' terminal on the 7 terminal ignition module provides reference pulses to the ECM indicating engine RPM and crankshaft position.

Idle Speed/Throttle Actuator - Mechanical: Technical Service Bulletins Throttle Kicker - Revised Checking Procedure

Number: 86-99

Section: 6C

Date: JUNE, 1986

Subject: THROTTLE LEVER ACTUATOR (THROTTLE KICKER) CHECKING PROCEDURE

Model and Year: 1985-86 C, K, G AND P MODELS WITH 4.3L, 5.0L, 5.7L ENGINES AND 1985 M VAN WITH 4.3L ENGINE

TO: ALL CHEVROLET DEALERS

A change has been made in the Throttle Lever Actuator (Throttle Kicker) Checking Procedure found in the 1985 and 1986 Light Duty Truck Service Manuals. The current checking procedure, found in sections 6E8-109 (1985) and 6E8-105 (1986), does not differentiate between the V6 and V8 engines. This may lead to unnecessary throttle kicker replacement on the V6 engine.

The throttle kicker used on certain Federal and California V6 engines is used to maintain a stable idle speed under varying engine load conditions. It operates on the manifold vacuum available at idle and does not have an internal plunger return spring, but instead relies on throttle return spring pressure to retract the plunger. The California HD V8 engines (Codes M and W) use a throttle kicker for decel emission control, and operates on higher decel manifold vacuum. The kicker designed for these applications uses an internal plunger return spring that causes the plunger to retract automatically when vacuum is released. These differences in design necessitate different checking procedures.

The current checking procedure in the 1985 and 1986 Light Duty Service Manual is correct for the California HD V8 engines. An additional procedure is required for the Federal and California V6 engines (listed below).

THROTTLE KICKER CHECKING PROCEDURE (V6 FEDERAL AND CALIFORNIA EMISSIONS - ENGINE VIN CODE N)

1. With engine off (not running), hold throttle half way open to allow throttle kicker plunger to fully extend for testing.

2. Use J-23738-A or BT-7517, hand operated vacuum pump to apply 20" Hg (68 kPa) vacuum to the throttle kicker.

^ Apply finger pressure to the plunger to see if it has extended fully. If not, replace throttle kicker.

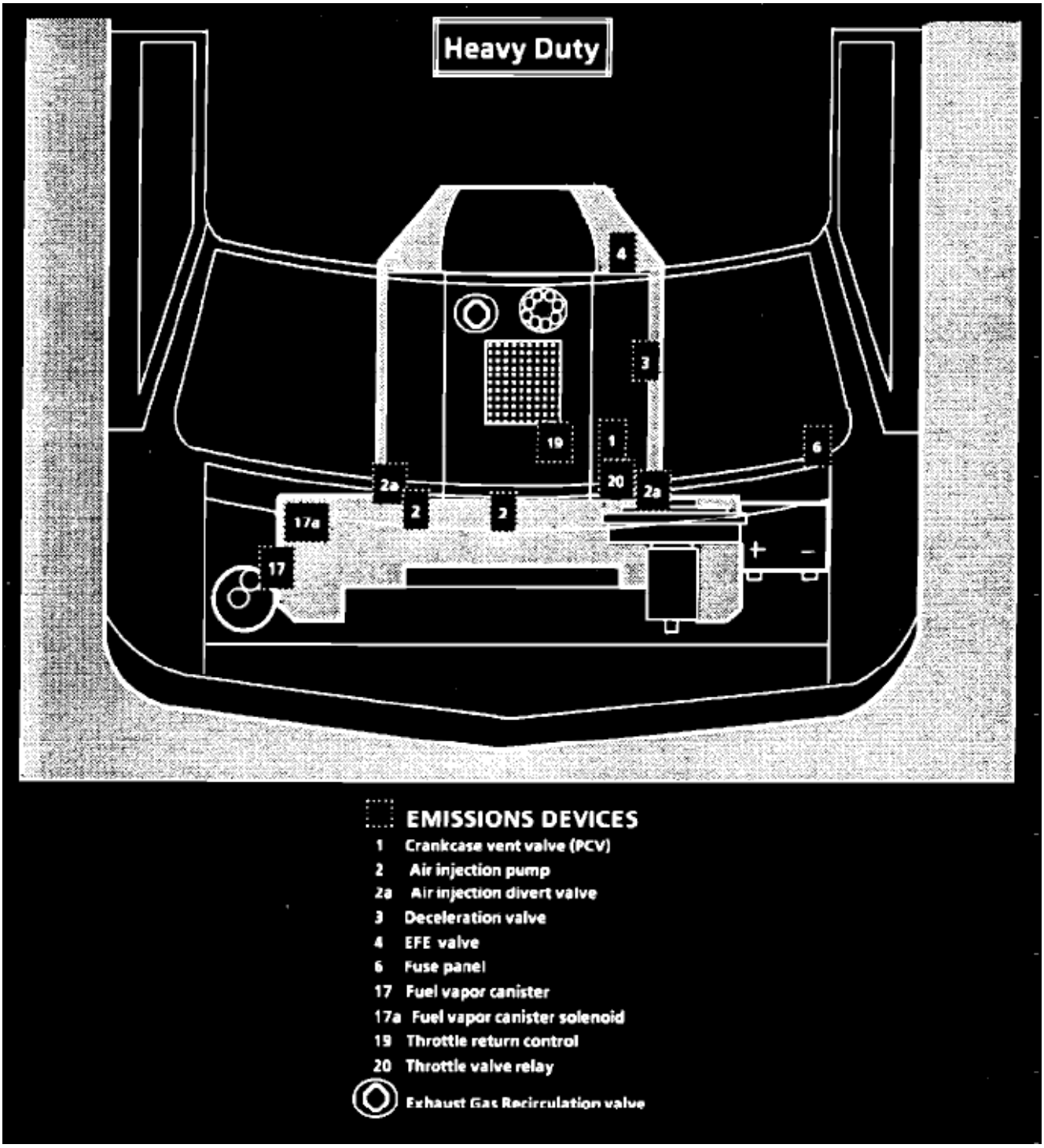
^ Observe vacuum gauge: Vacuum should hold for at least twenty seconds. If not, replace throttle kicker.

3. Release vacuum to the kicker.

^ Apply finger pressure to the plunger, to move it to its retracted position. If plunger will not retract, replace the kicker.

!!!! IMPORTANT !!!!

THE THROTTLE KICKER USED ON THE V6 ENGINE BY DESIGN DOES NOT HAVE AN INTERNAL PLUNGER RETURN SPRING. WHEN VACUUM IS RELEASED FROM KICKER, THE PLUNGER WILL NOT RETRACT ON ITS OWN. THIS UNIT REQUIRES THROTTLE LEVER PRESSURE TO RETRACT THE PLUNGER.

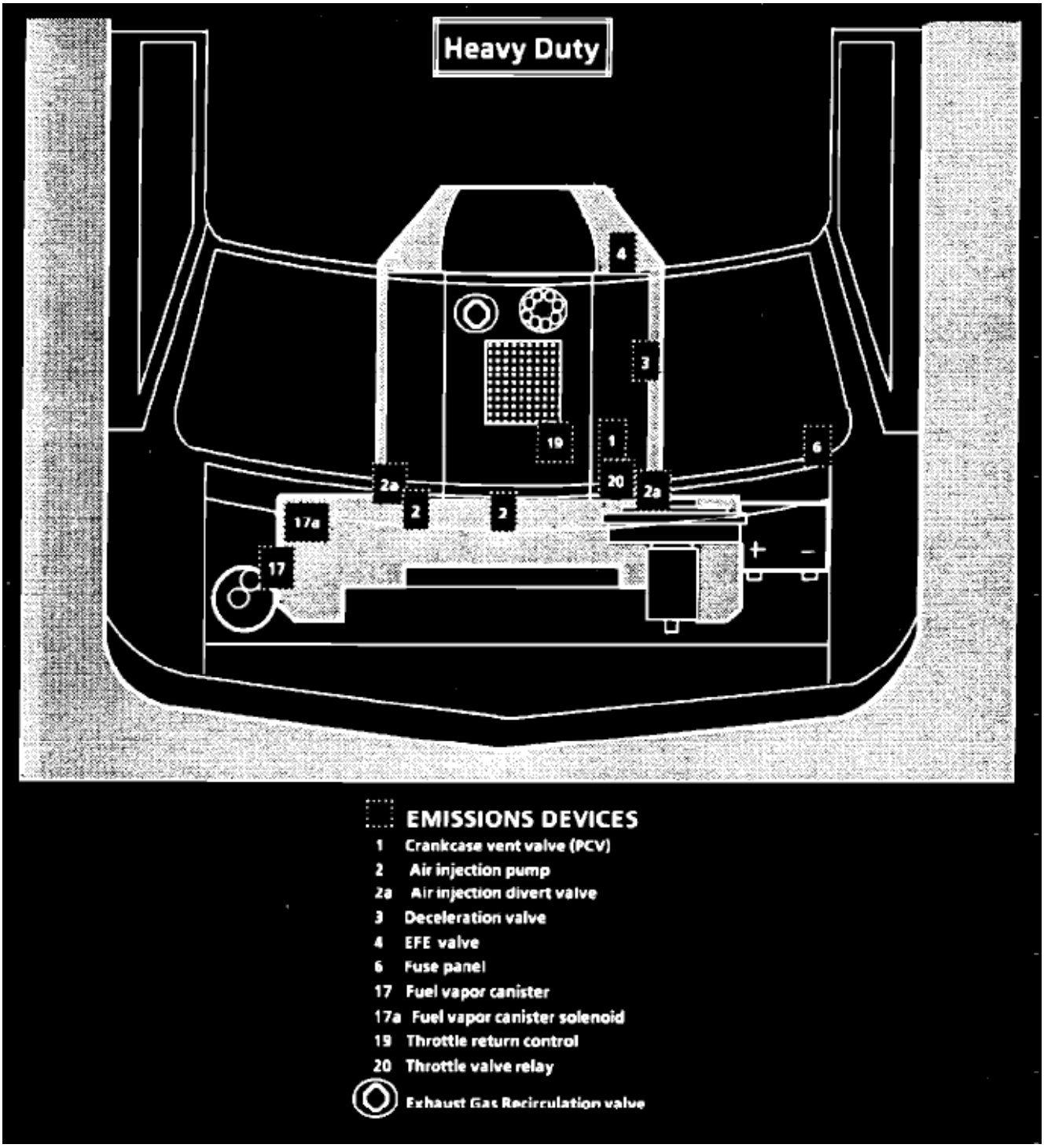


Idle Speed/Throttle Actuator - Mechanical: Locations

Underhood & Engine Components

LH Top Front Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions



Idle Up Control Relay: Locations

Underhood & Engine Components

LH Top Front Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

Engine	Year	Resistance (ohms)
All TBI	1981-90	20 min.

Idle Speed Control Motor: Electrical Specifications

IDLE SPEED CONTROL

Measured between terminals A& B and C & D.

Idle Speed Control Motor: Mechanical Specifications

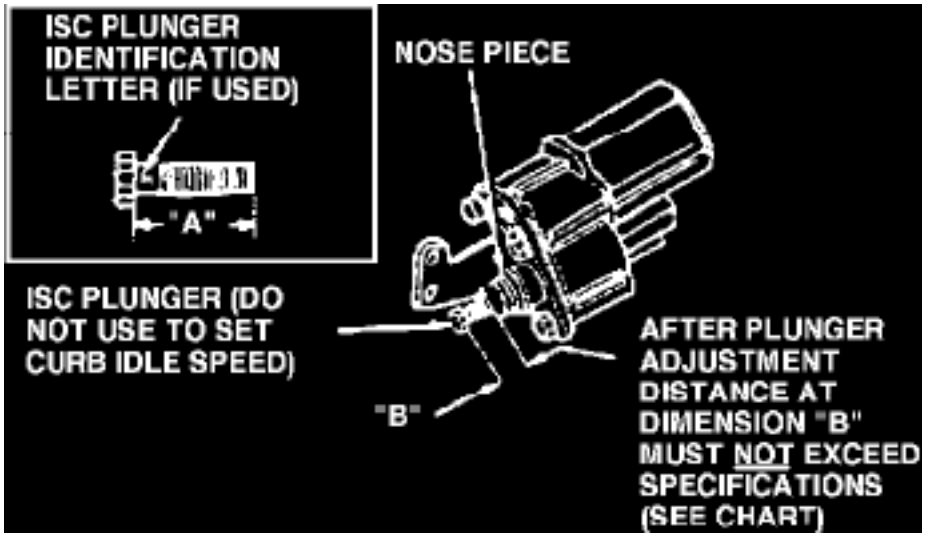
ISC PLUNGER ADJUSTMENT CHART

Identification Letter	Plunger Length Dimension "A"	Plunger Length Dimension "B"
None	14.1 mm (9/16")	5.6 mm (7/32")
None	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/6'4")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1LL)	17.1 mm (43/64")
L	27.5 mm (1 -3/32")	19.0 mm (3/4")
J	30.0 mm (1-3/16")	21.5 mm (27/32")
N	32.0 mm (1-17/64")	23.5 mm (59/64")
T	34.0 mm (1-11/32")	25.5 mm (1")

Idle Speed Control Motor: Description and Operation

The ISC assembly controls engine idle speed according to ECM programming.

When the throttle lever rests against the ISC plunger, the ISC acts as a dashpot on throttle closing per second.



Idle Speed Control Motor: Adjustments

On engines equipped with an idle speed control motor, idle speed is controlled by an electrical signal from the ECM. Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows. See Underhood Emission Label.

Plunger - Maximum Adjustment

NOTE: Prior to adjustment, check for an identification letter on the ISC plunger. If NO LETTER appears, using Tool J-29607, BT-8022 or equivalent,

remove plunger from ISC Unit. Then, measure length of plunger from back side of plunger head to end of plunger screw - Dimension "A". Record this measurement for use at Step 17. Reinstall plunger in ISC unit, turning plunger into a preset position so that the distance measured from the back side of the plunger head to the ISC nosepiece is LESS THAN Dimension "B".

ISC PLUNGER ADJUSTMENT CHART

Identification Plunger Length Plunger Length

Letter Dimension "A" Dimension "B"

None 14.1 mm (9/16") 5.6 mm (7/32")

None 16.3 mm (41/64") 8.0 mm (5/16")

X 18.5 mm (47/64") 10.0 mm (25/6'4")

A 19.3 mm (49/64") 10.8 mm (27/64")

Y 20.5 mm (51/64") 12.0 mm (15/32")

S 21.2 mm (27/32") 12.7 mm (1/2")

Z 22.5 mm (7/8") 14.0 mm (35/64")

G 23.2 mm (29/32") 14.7 mm (37/64")

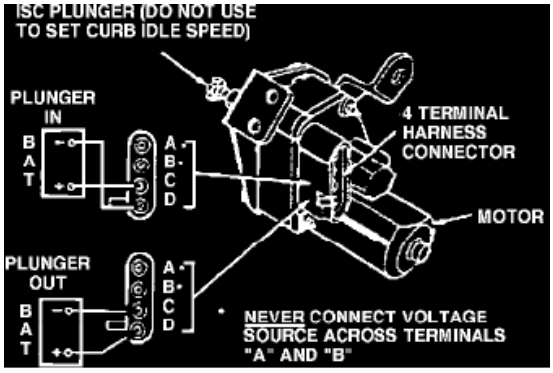
E 25.6 mm (1LL) 17.1 mm (43/64")

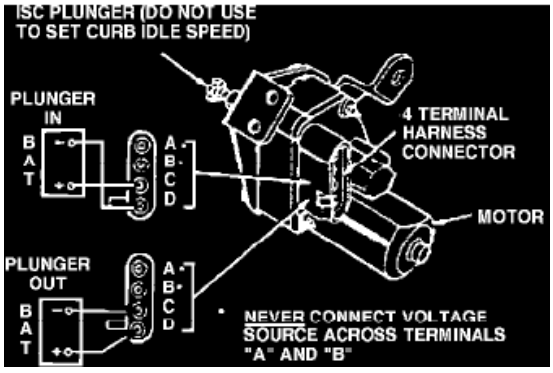
L 27.5 mm (1 -3/32") 19.0 mm (3/4")

J 30.0 mm (1-3/16") 21.5 mm (27/32")

N 32.0 mm (1-17/64") 23.5 mm (59/64")

T 34.0 mm (1-11/32") 25.5 mm (1")


ISC PLUNGER (DO NOT USE TO SET CURB IDLE SPEED)
PLUNGER IN
BAT
A B C D
4 TERMINAL HARNESS CONNECTOR
MOTOR
PLUNGER OUT
BAT
A B C D
NEVER CONNECT VOLTAGE SOURCE ACROSS TERMINALS "A" AND "B"


ISC PLUNGER (DO NOT USE TO SET CURB IDLE SPEED)
PLUNGER IN
BAT
A B C D
4 TERMINAL HARNESS CONNECTOR
MOTOR
PLUNGER OUT
BAT
A B C D
NEVER CONNECT VOLTAGE SOURCE ACROSS TERMINALS "A" AND "B"

Idle Speed Control Assembly - Typical

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures - see emission label for latest instructions.

2. Before starting engine, place transmission in PARK (AUTO trans.) or NEUTRAL (MANUAL transmission), set parking brake, and block drive wheels.

3. Connect dwell meter to mixture control (M/C) solenoid dwell lead. Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF".

5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary).

6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

7. Unplug connector from ISC motor.

8. Fully retract ISC plunger by applying 12 volts to terminal "C" and grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

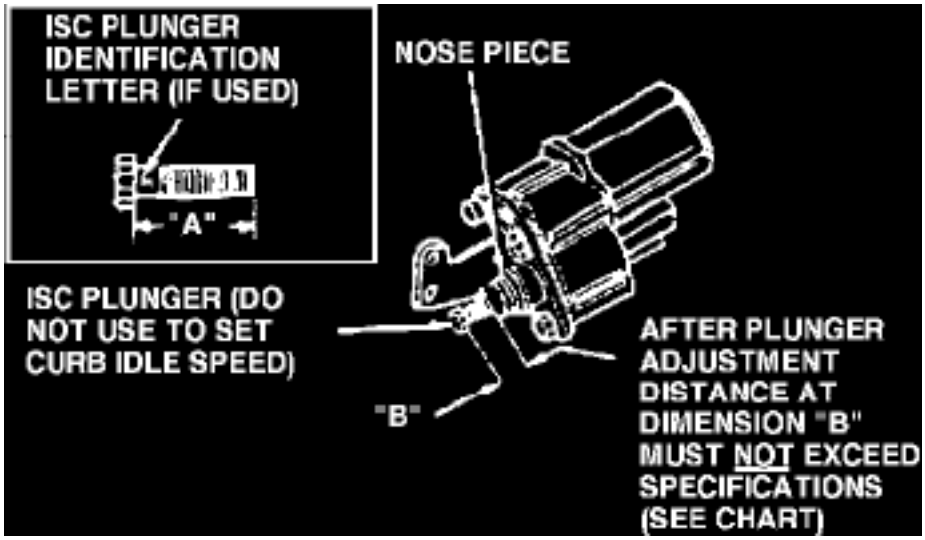
9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place A.T. transmission in Drive.

11. With ISC plunger fully retracted, adjust carburetor base (slow) idle stop screw (minimum authority) to the RPM shown in the carburetor charts.

12. PLACE TRANSMISSION IN PARK (AUTO TRANS.) OR NEUTRAL (MANUAL TRANS.).

Idle Speed Control Assembly - Typical



13. Fully extend ISC Plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC Motor Connection. Leave power

applied only long enough to extend the plunger.

14. Manual transmission: Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown

in carburetor charts.

15. Automatic Transmission:

a. With transmission in PARK, using Tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

b. With parking brake set and drive wheels blocked, place transmission in drive. Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown in carburetor charts.

Plunger - Maximum Adjustment

16. Recheck ISC "Maximum Authority" RPM with voltage applied to Motor (Step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nose piece, Dimension "B". Dimension must NOT exceed

that shown by plunger type as either identified by plunger length or letter identification.

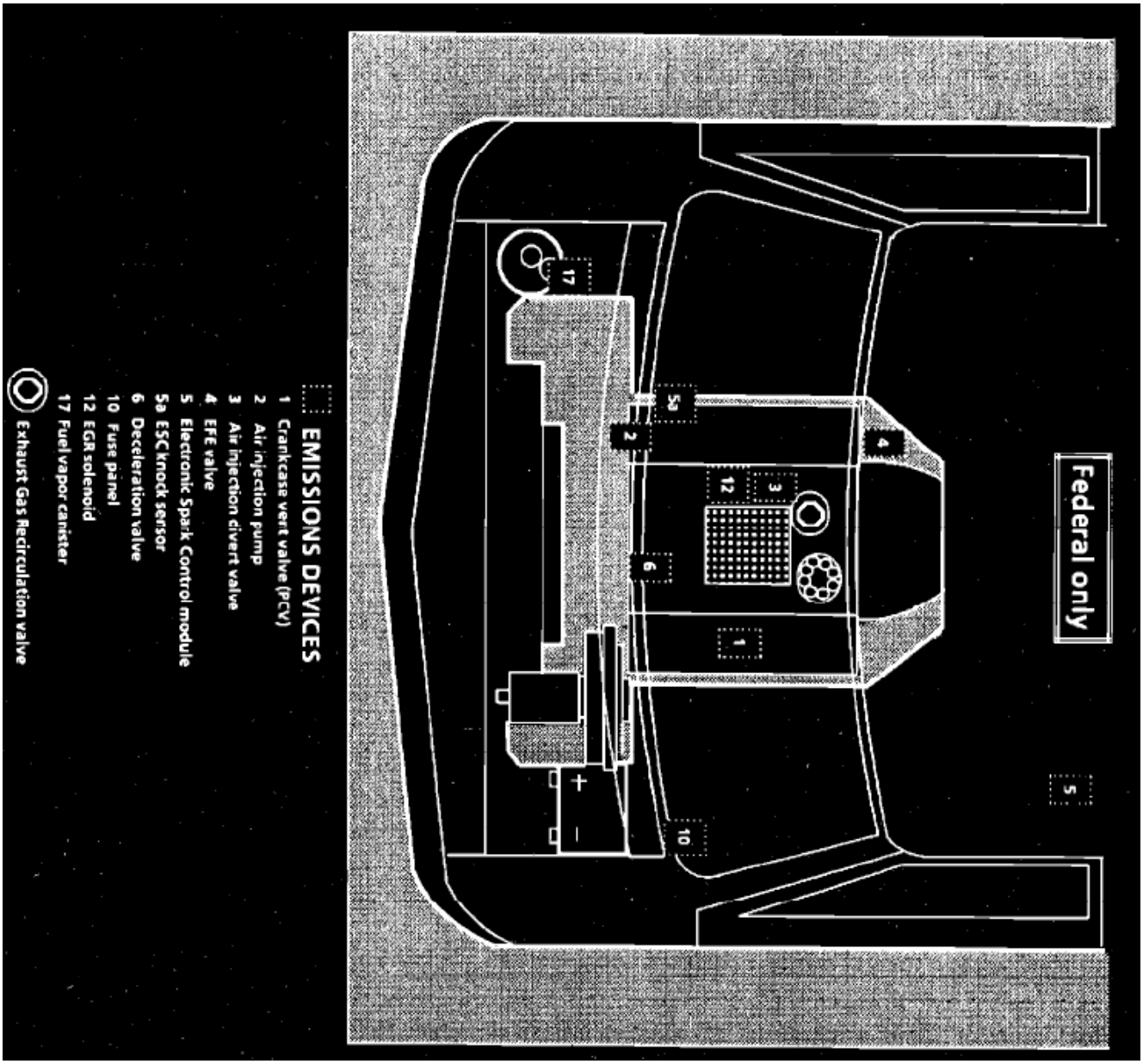
18. Fully retract ISC Plunger (Step 8). Place transmission in PARK (AUTO Trans.) or NEUTRAL (MANUAL Transmission) and turn ignition "Off".

Disconnect 12 Volt Power source, Ground lead, Tachometer and Dwell Meter. With ignition "Off" reconnect four Terminal Harness connectors to ISC Motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By restoring

the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Computers and Control Systems > Knock Sensor > Component Information > Locations > Electronic Spark Control Knock Sensor

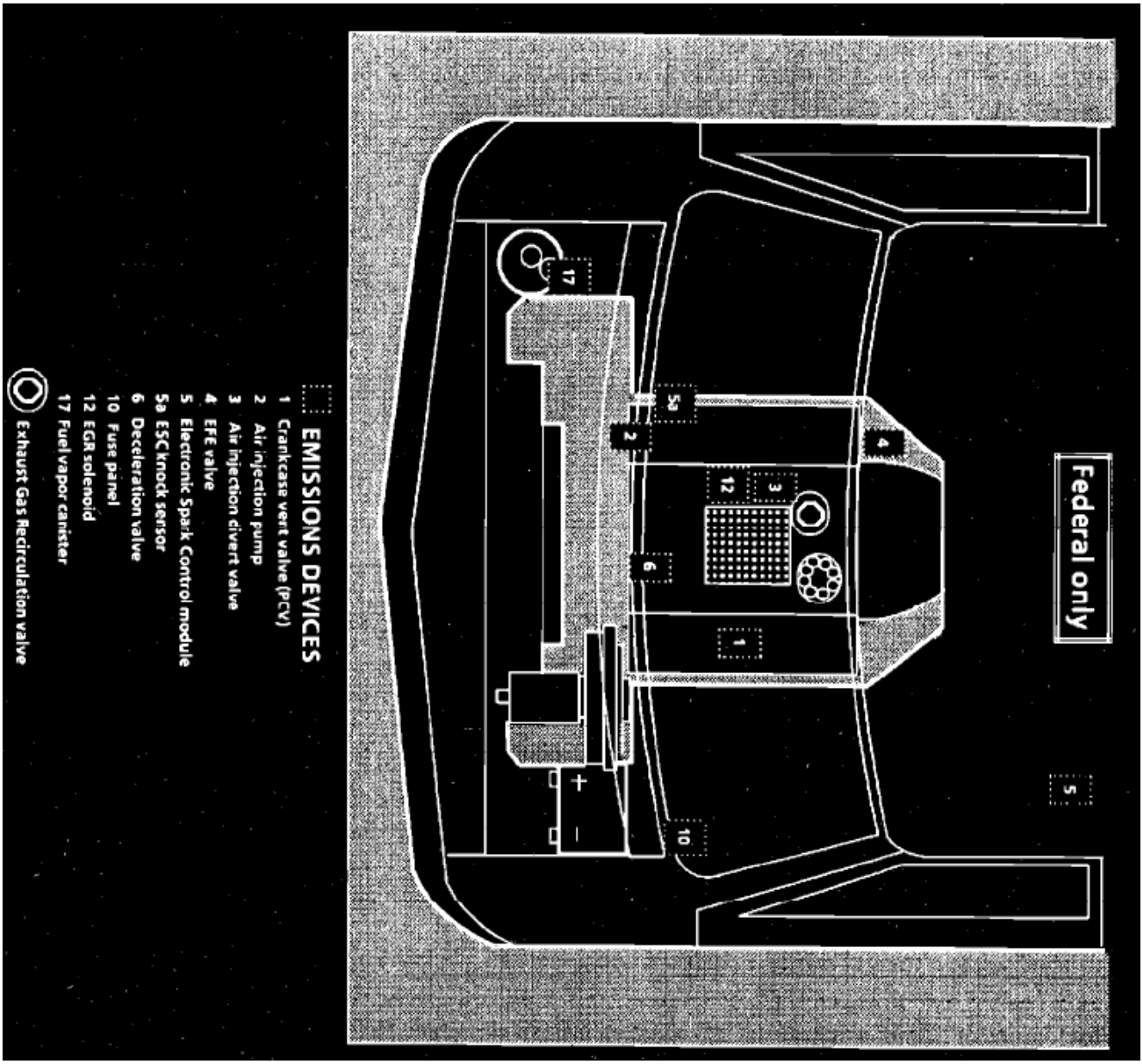


Knock Sensor: Locations Electronic Spark Control Knock Sensor

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Knock Sensor: Locations Electronic Spark Control Module

Underhood & Engine Components.

Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

Malfunction Indicator Lamp: Description and Operation

The instrument panel mounted ``Check Engine'' lamp is used to alert the operator of malfunctions within the C3 system. When the ignition is on with the engine stopped, the lamp is illuminated as a bulb check. When the engine is running, the lamp will be illuminated whenever the ECM senses a system malfunction. In addition, the lamp is used to access trouble codes stored in the ECM trouble code memory.

Malfunction Indicator Lamp: Service and Repair

The Check Engine Lamp will be illuminated when the ignition switch is placed in the On position. When the engine is started, the lamp should go off. If the lamp remains on for 10 seconds or constantly after the engine is started, the self diagnosis system has detected a problem and has stored a code in the system Electronic Control Module (ECM). After diagnosis and repair, the ECM memory can be cleared of codes by removing the ECM fuse or disconnecting the battery ground cable for approximately 30 seconds, with ignition switch in the Off position. It should be noted, that if battery ground cable is disconnected to clear codes, components such as clocks, electronically tuned radios etc., will have to be reset.

Manifold Pressure/Vacuum Sensor: Technical Service Bulletins MAP - Revised Check Chart for DTC's 33, 34, 63, 64

Number: 90-199-6E

Section: 6E

Date: March 1990

Corporate Bulletin No.: 016510

Subject: REVISED CHART C-1D, CODE 33, 34, 63, 64

Model and Year: 1980-90 PASSENGER CARS AND TRUCKS

TO: ALL CHEVROLET DEALERS

This bulletin revises the Manifold Absolute Pressure (MAP) Output Check Chart C-1D and updates Code 33, Code 34, Code 63, and Code 64 in the Service Manual section on "Driveability And Emissions" (Section 6E1, 6E2, and 6E3). This information applies to all MAP Sensors on 1980-1990 vehicles with gasoline engines (except turbocharged) with green (standard) MAP sensor electrical connector insert or the solid black MAP sensor electrical connector insert.

The revised chart information:

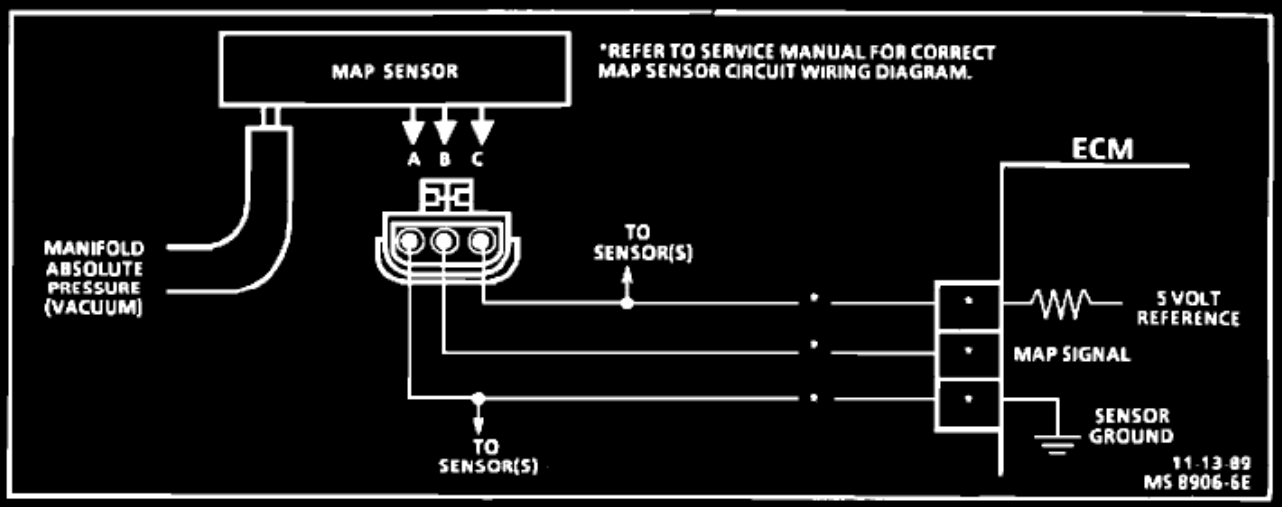


CHART C-1D

MANIFOLD ABSOLUTE PRESSURE (MAP) VOLTAGE OUTPUT CHECK

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor measures the changes in the intake manifold pressure which result from engine load (intake manifold vacuum) and rpm changes; and converts these into a voltage output. The ECM sends a 5 volt reference voltage to the MAP sensor. As the manifold pressure changed, the output voltage of the sensor also changes. By monitoring the sensor output voltage, the ECM knows the manifold pressure. A lower pressure (low voltage) output voltage will be about 1 - 2 volts at idle. While higher pressure (high voltage) output voltage will be about 4 - 4.8 at Wide Open Throttle (WOT). The MAP sensor is also used, under certain conditions, to measure barometric pressure, allowing the ECM to make adjustments for different altitudes. The ECM uses the MAP sensor to control fuel delivery and ignition timing.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

Important

- Be sure to use the same Diagnostic Test Equipment for all measurements.

1. When comparing "Scan" readings to a known good vehicle, it is important to compare vehicles that use a MAP sensor having the same color insert or having the same "Hot Stamped" number. See figures on facing page.
2. Applying 34 kPa (10" Hg) vacuum to the MAP sensor should cause the voltage to change. Subtract second reading from the first. Voltage value should be greater than 1.5 volts. Upon applying vacuum to the sensor, the change in voltage should be instantaneous. A slow voltage change indicates a faulty sensor.
3. Check vacuum hose to sensor for leaking or restriction. Be sure that no other vacuum devices are connected to the MAP hose.

NOTE: Make sure electrical connector remains securely fastened.

4. Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connection. Output changes greater than 1 volt indicate a bad connector or connection. If OK, replace sensor.

CHART C-1D

MANIFOLD ABSOLUTE PRESSURE (MAP) VOLTAGE OUTPUT CHECK

NOTE: THIS CHART ONLY APPLIES TO MAP SENSORS HAVING GREEN OR BLACK COLOR KEY INSERT (SEE BELOW).

1. • IGNITION "ON," ENGINE "OFF."
   • "SCAN" TOOL SHOULD INDICATE A MAP SENSOR VOLTAGE.
   • COMPARE THIS READING WITH THE READING OF A KNOWN GOOD VEHICLE. SEE FACING PAGE TEST DESCRIPTION, STEP 1.
   • VOLTAGE READING SHOULD BE WITHIN, ± .4 VOLT.
   IS IT?

YES

2. • DISCONNECT AND PLUG VACUUM SOURCE TO MAP SENSOR.
   • CONNECT A HAND VACUUM PUMP TO MAP SENSOR.
   • START ENGINE.
   • NOTE MAP SENSOR VOLTAGE.
   • APPLY 34 kPa (10" Hg) OF VACUUM AND NOTE VOLTAGE CHANGE. SUBTRACT SECOND READING FROM THE FIRST. VOLTAGE VALUE SHOULD BE GREATER THAN 1.5 VOLTS.
   IS IT?

YES

3. NO TROUBLE FOUND. CHECK SENSOR VACUUM SOURCE FOR LEAKAGE OR RESTRICTION. BE SURE THIS SOURCE SUPPLIES VACUUM TO MAP SENSOR ONLY.

NO

REPLACE SENSOR.

NO

4. CHECK SENSOR CONNECTION. IF OK, REPLACE SENSOR.

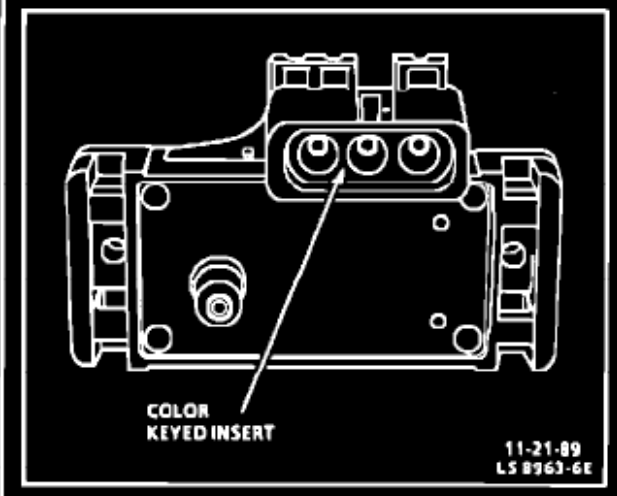


Figure 1 - Color Key Insert

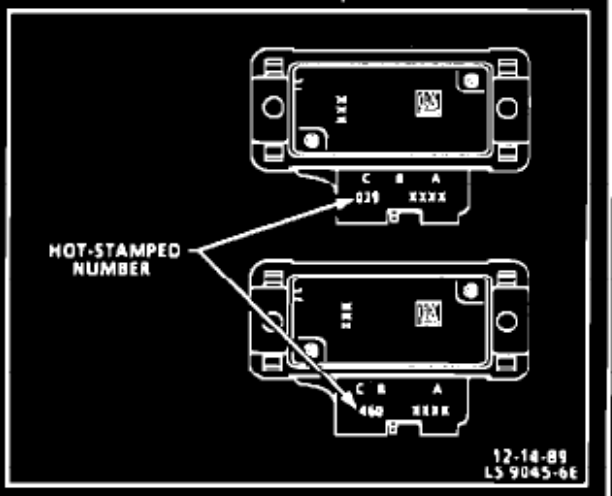


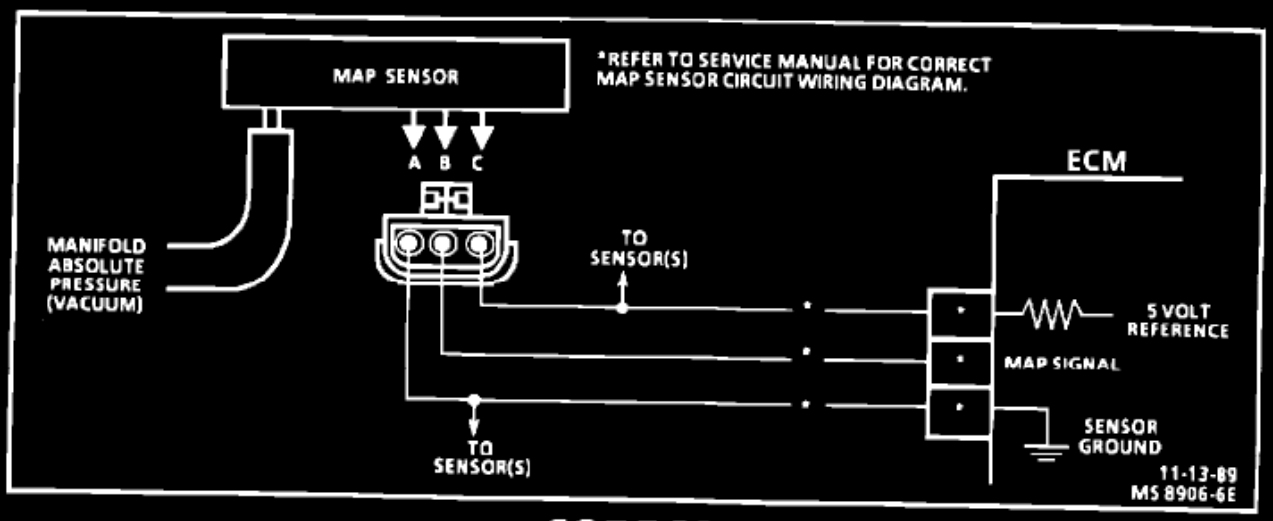
Figure 2 - Hot-Stamped Number

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "SERVICE ENGINE SOON" LIGHT.

2-28-90
• 753162-6E

- Diagnostic Chart C-1D.

The updated chart information:



CODE 33

MANIFOLD ABSOLUTE PRESSURE (MAP) OUTPUT CHECK
(SIGNAL VOLTAGE HIGH - LOW VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. This step will determine if Code 33 is the result of a hard failure or an intermittent condition.
   A Code 33 will set under the following conditions:
   - MAP signal voltage is too high (low vacuum).
   - TPS less than 2%.
   - These conditions exist longer than 5 seconds.
2. This step simulates conditions for a Code 34. If the ECM recognizes the change, the ECM and CKT 416 and CKT 432 are OK. If CKT 469 is open, there may also be a stored Code 23.

Diagnostic Aids:

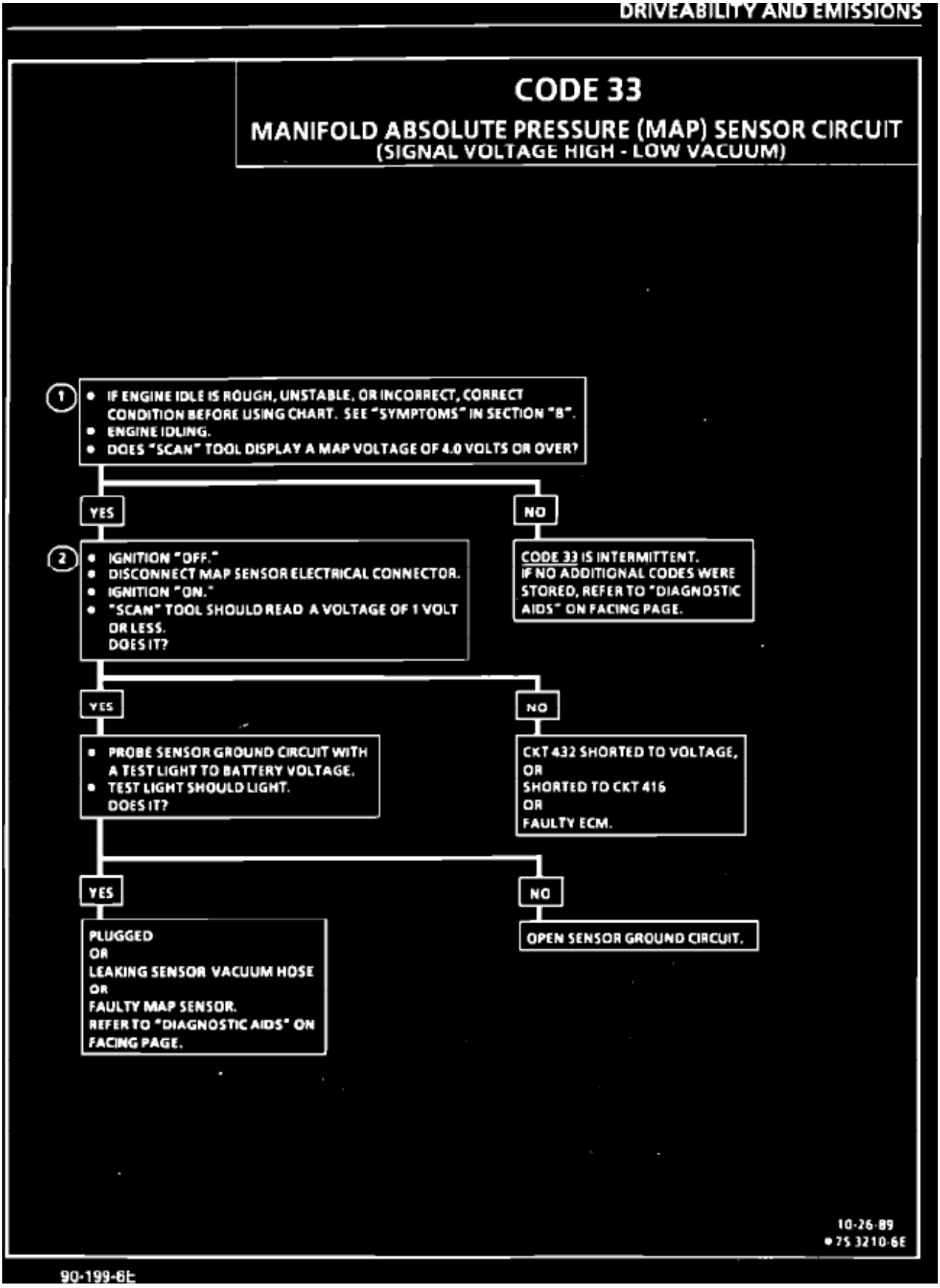
With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volt.

A Code 33 will result if CKT 469 is open or if CKT 432 is shorted to voltage or to CKT 416.

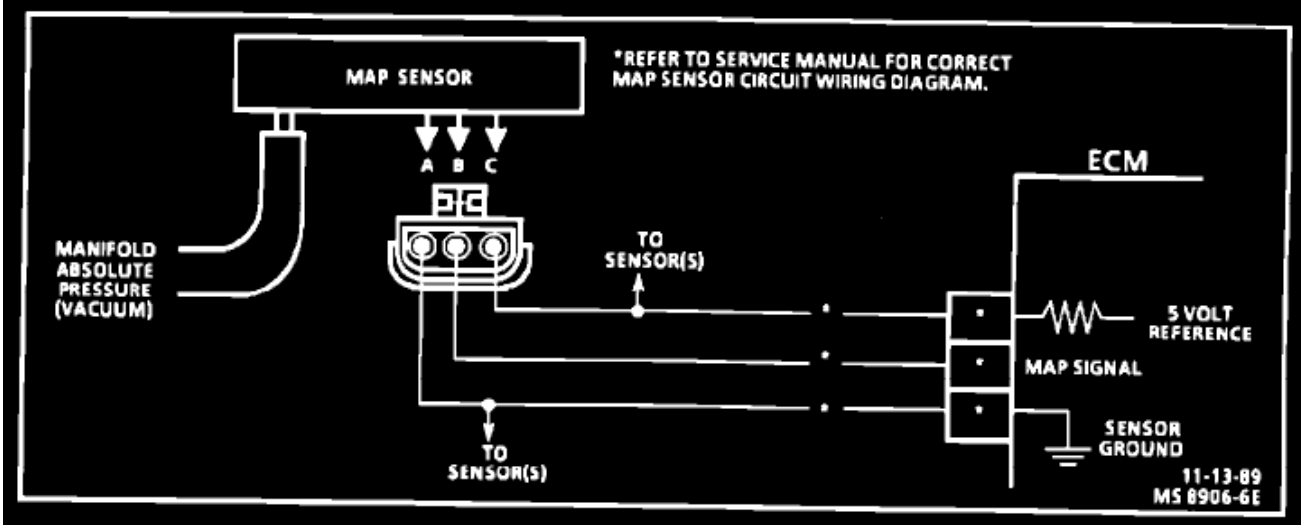
If Code 33 is intermittent, refer to Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.



- Diagnostic Chart Code 33.



CODE 34

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. This step determines if Code 34 is the result of a hard failure or an intermittent condition. A Code 34 will set when MAP signal voltage is too low and the ignition is "ON."
2. Jumpering harness terminals "B" to "C" (5 volts to signal circuit) will determine if the sensor is at fault, or if there is a problem with the ECM or wiring.
3. The "Scan" tool may not display 5 volts. The important thing is that the ECM recognizes the voltage as more than 4 volts, indicating that the ECM and CKT 432 are OK.

Diagnostic Aids:

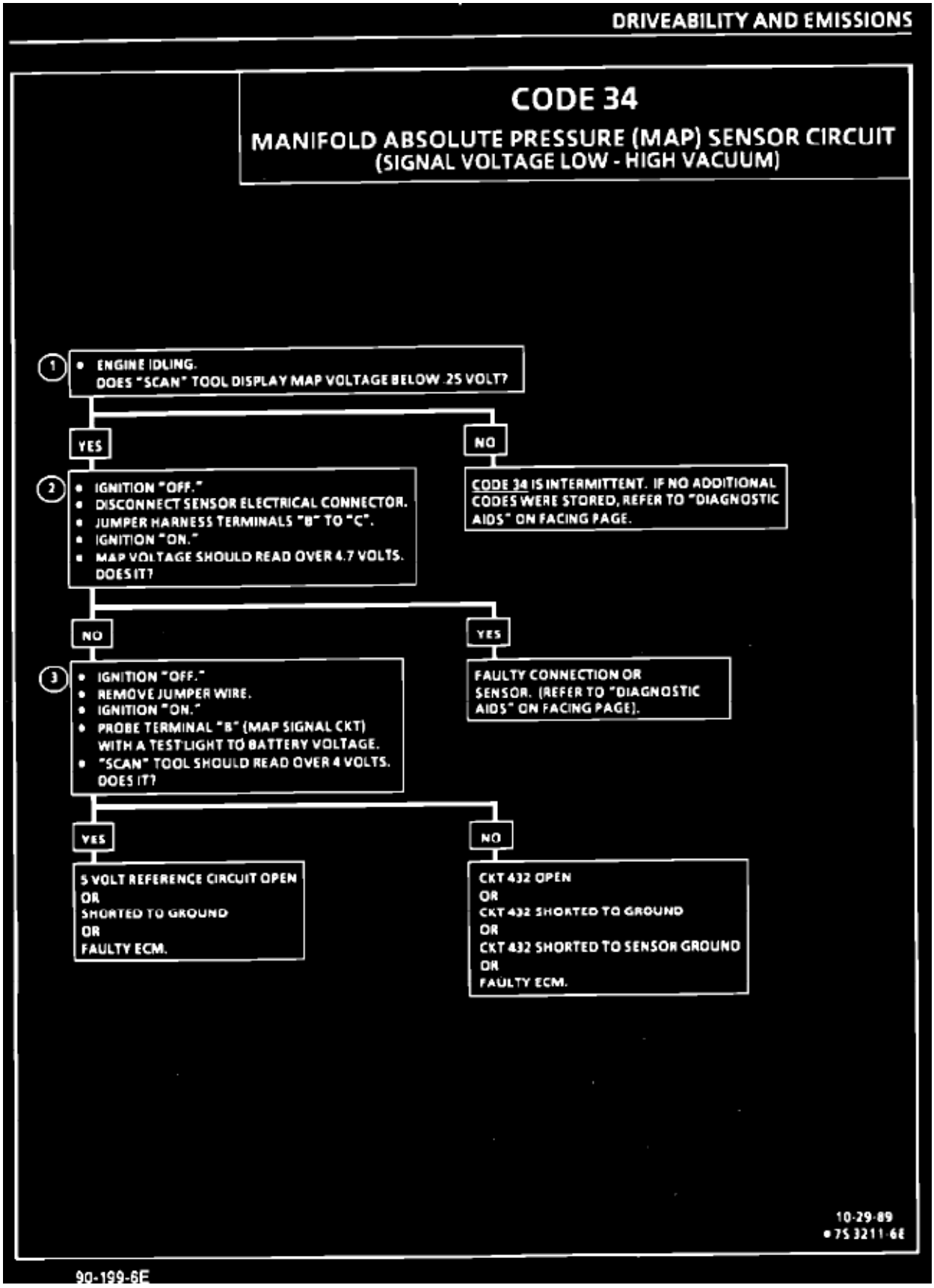
An intermittent open in CKT 432 or CKT 416 will result in a Code 34. With the ignition "ON" and the engine "OFF," the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude.

Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volts. Also CHART C-1D can be used to test the MAP sensor. Refer to "Intermittents" in Section "B".

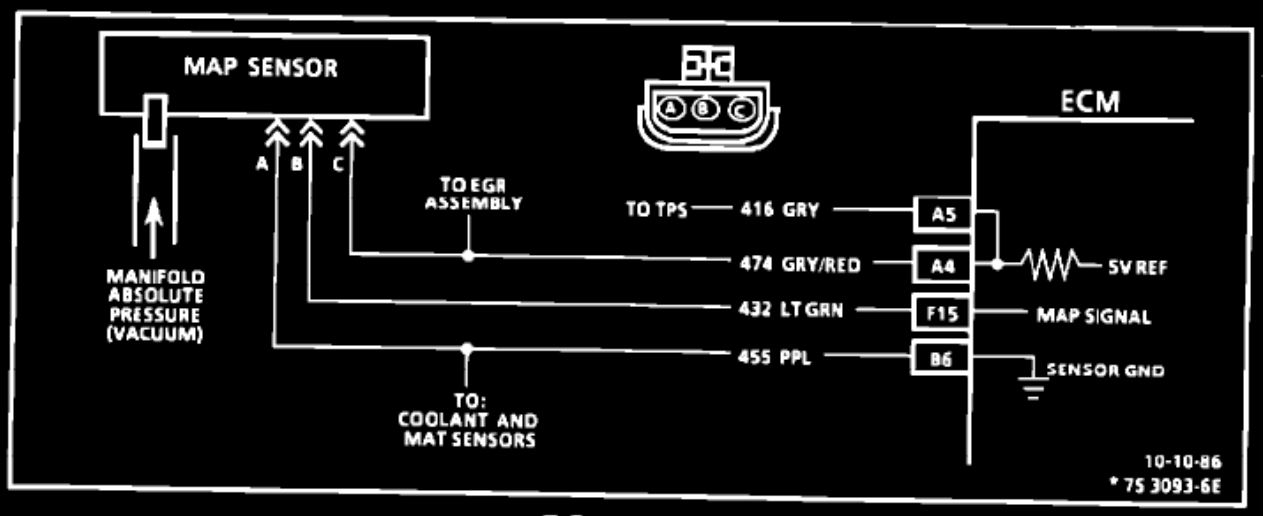
NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor By hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.

90-199-6E



- Diagnostic Chart Code 34.



CODE 63

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE HIGH - LOW VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 63 will set when:
   - Engine running.
   - Manifold pressure greater than 75.3 kPa (A/C "OFF") 81.2 kPa (A/C "ON").
   - Throttle angle less than 2%.
   - Conditions met for 2 seconds.

   Engine misfire or a low unstable idle may set Code 63.
2. With the MAP sensor disconnected, the ECM should see a low voltage if the ECM and wiring are OK.

Diagnostic Aids:

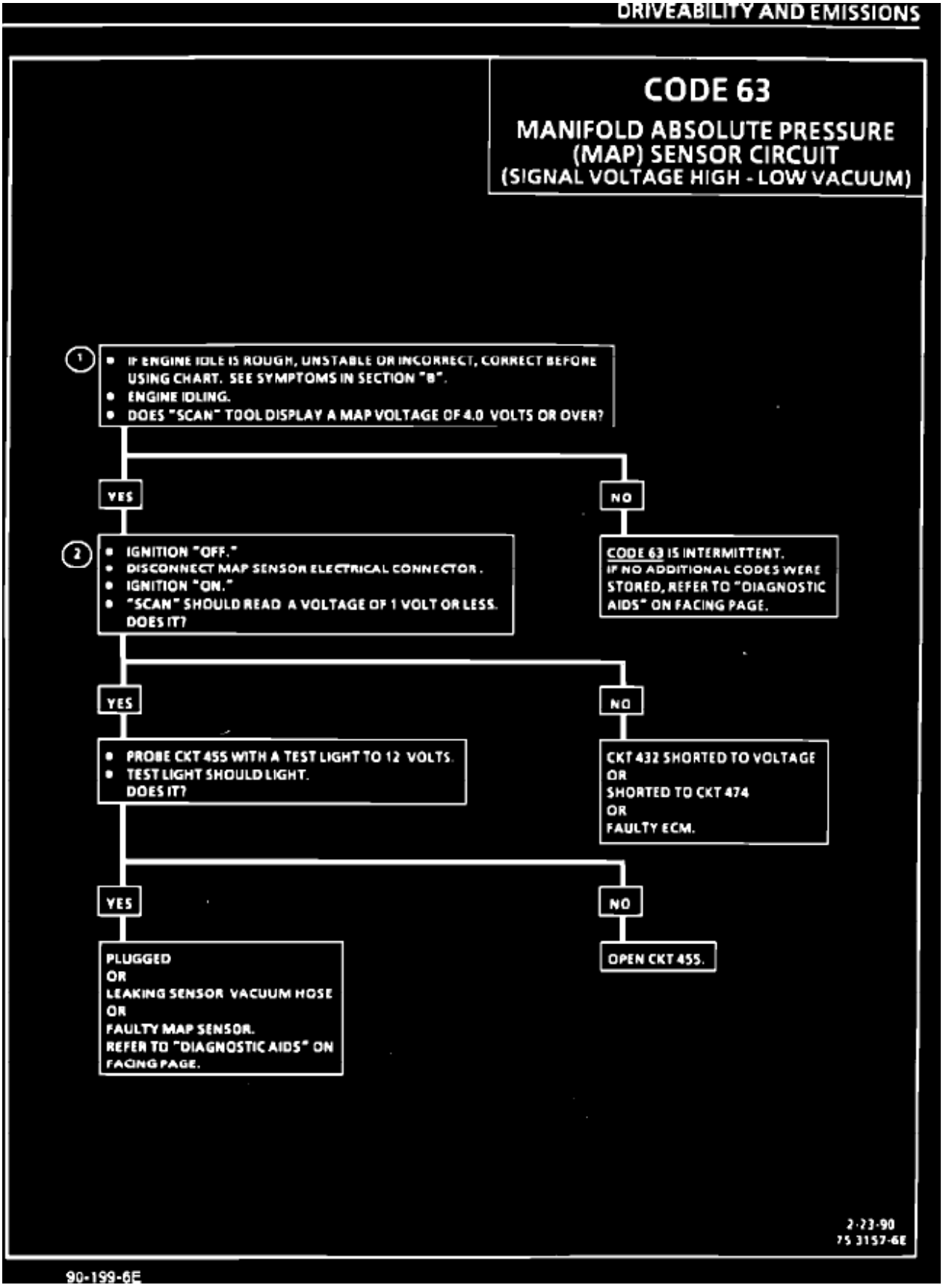
With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volt.

If idle is rough or unstable, refer to symptoms in Section "B" for items which can cause an unstable idle.

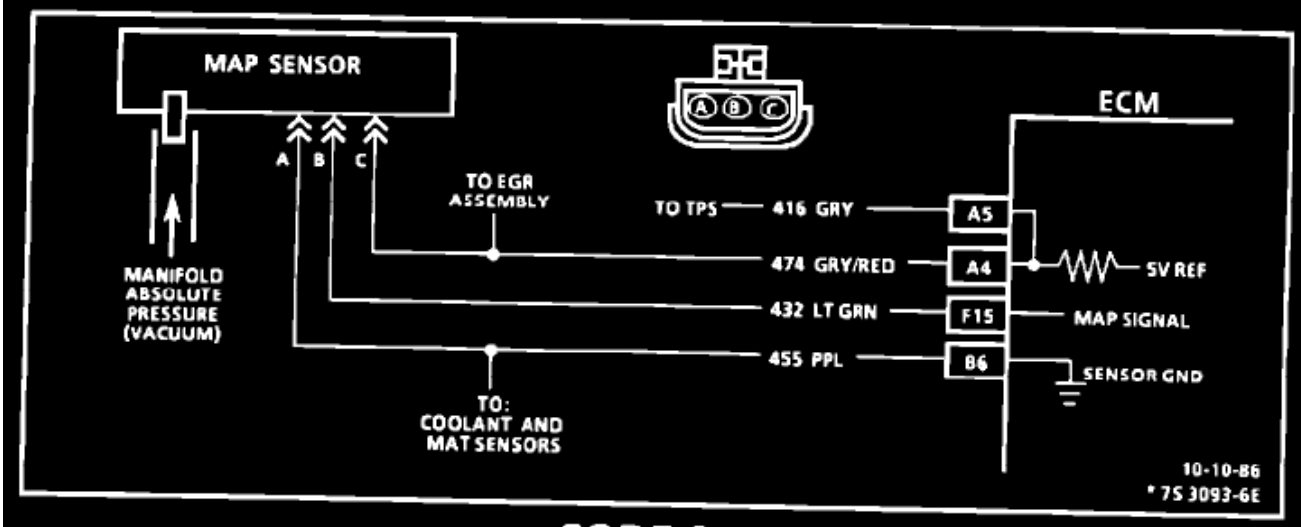
An open in CKT 455 or the connection will result in a Code 63.

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.



- Diagnostic Chart Code 63.



CODE 64

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 64 will set if:
   - Engine rpm less than 600.
   - Manifold pressure reading less than 13 kPa.
   - Conditions met for 1 second.

   or
   - Engine rpm greater than 600.
   - Throttle angle over 20%.
   - Manifold pressure less than 13 kPa.
   - Conditions met for 1 second.
2. This test to see if the sensor is at fault for the low voltage, or if there is an ECM or wiring problem.
3. This simulates a high signal voltage to check for an open in CKT 432. If the test light is bright during this test, CKT 432 is probably shorted to ground. If "Scan" reads over 4 volts at this test, CKT 474 can be checked by measuring the voltage at terminal "C" (should be 5 volts).

Diagnostic Aids:

An intermittent open in CKTs 432 or 474 will result in a Code 64.

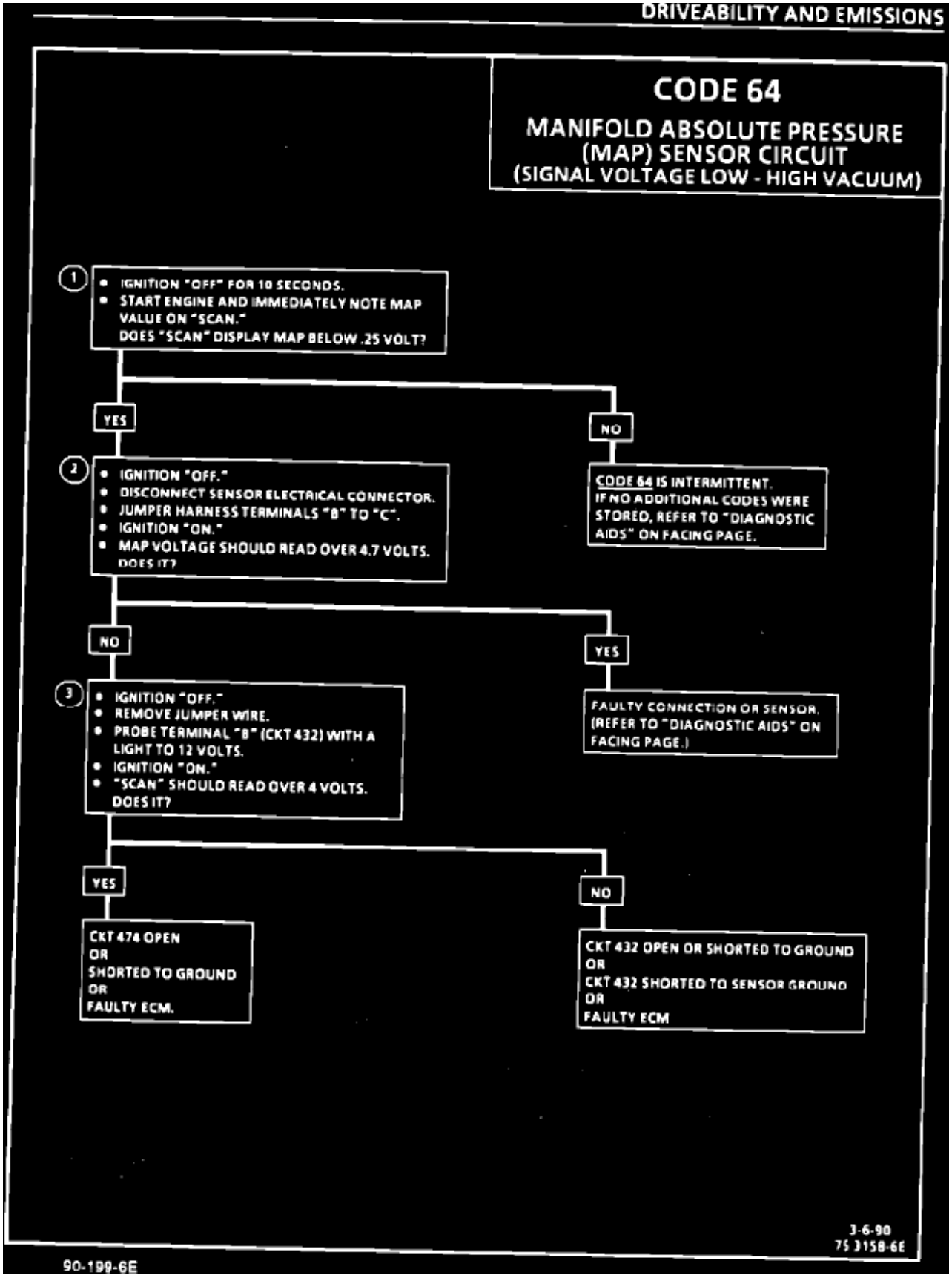
With the ignition "ON" and the engine "OFF," the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude.

Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volts. Also CHART C-1D can be used to test the MAP sensor. Refer to "Intermittents" in Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor By hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.

90-199-6E



- Diagnostic Chart Code 64.

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-90	Barometric, Manifold Absolute	3.8-5.5 @ 0-1000 3.6-5.3 @ 1000-200 3.5-5.1 @ 2000-300 3.3-5.0 @ 3000-400 3.2-4.8 @ 4000-500 3.0-4.6 @ 5000-600 2.9-4.5 @ 6000-700 2.5-4.3 @ 7000-

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-88	Vacuum	.50-.64 @ ign. on 1.7-3.0*

* 10 in./250 mm applied to unit.

Manifold Pressure/Vacuum Sensor: Specifications

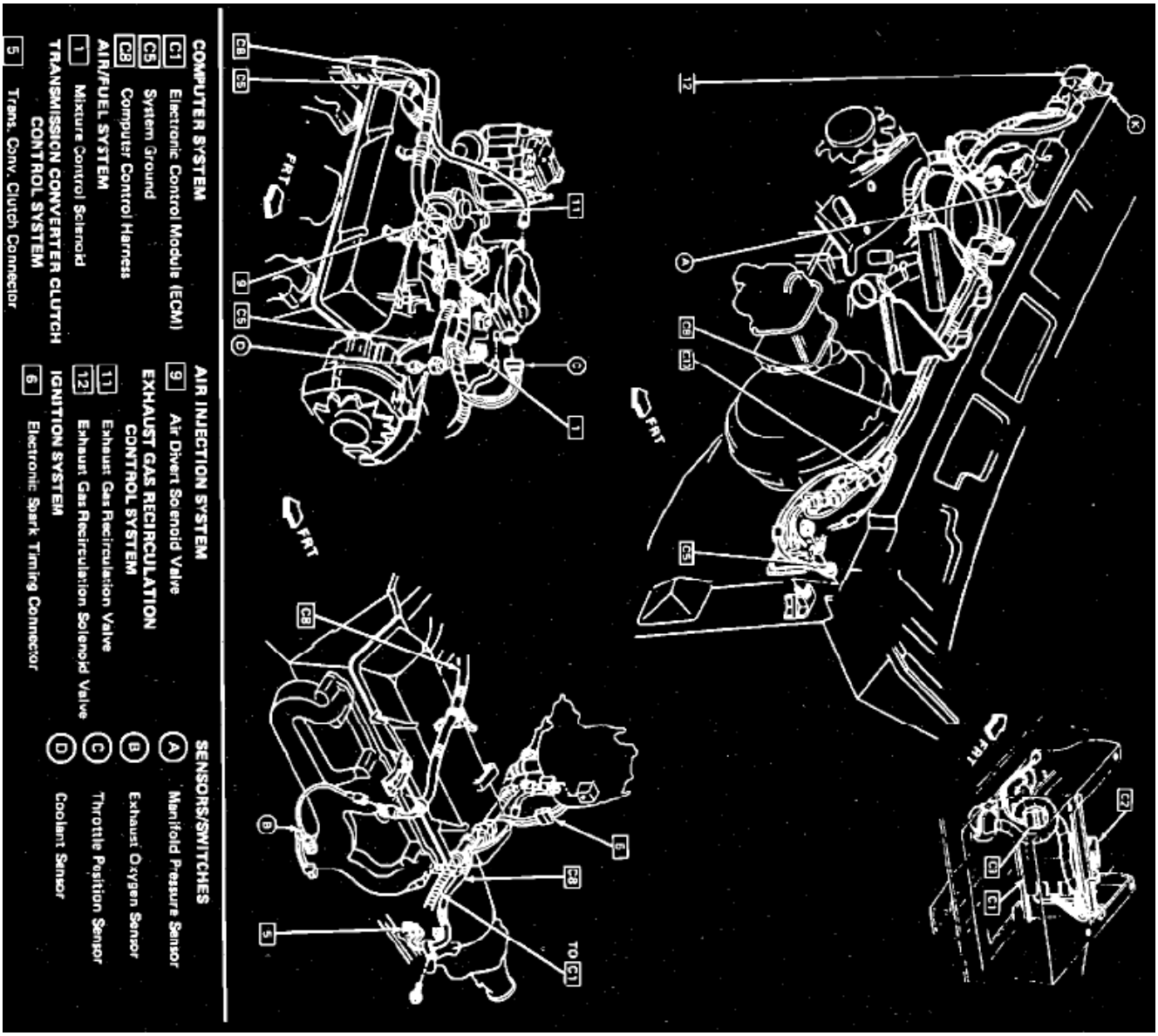
MANIFOLD ABSOLUTE, VACUUM AND BAROMETRIC PRESSURE SENSORS

Engines may use one, or a combination of these sensors. All sensors appear the same. Manifold Absolute Pressure sensors have a vacuum line connected between the unit and manifold vacuum. On Barometric Pressure sensors, the line is not used and the connector is either open or has a filter installed over it. Pressure sensors also have a vacuum line between the sensor and intake manifold and only appear on carburetted models.

Barometric Pressure Sensors: Measure voltage with ignition on and engine off.

Manifold Absolute Pressure Sensors: Measure voltage with ignition on and engine off. Start engine and apply 10 in./ 250 mm Hg to unit, voltage should be 1.2-2.3 volts less.

Pressure Sensors: Measure voltage as indicated.

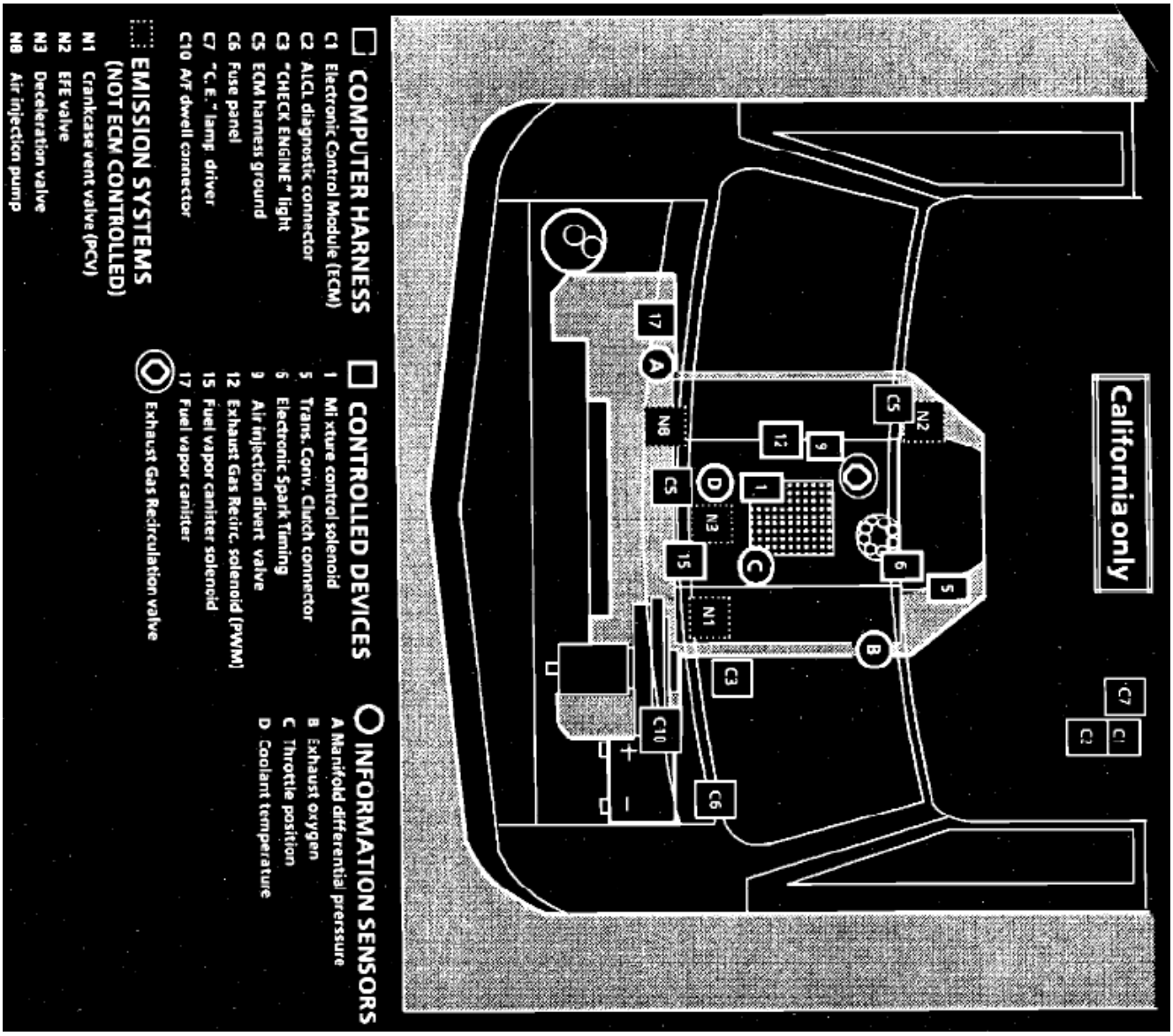


Manifold Pressure/Vacuum Sensor: Locations Manifold Absolute Pressure (MAP) Sensor

Engine Components.

Center Of Dash Panel

Applicable to: 1985 G Series w/V8



Manifold Pressure/Vacuum Sensor: Locations Manifold Differential Pressure Sensor

Underhood & Engine Components.

RH Side Of Dash Panel

Applicable to: 1985 G Series w/5.0L & 5.7L California

Manifold Pressure/Vacuum Sensor: Service and Repair

The MAP and Vacuum sensors are accessible through the engine compartment. The BARO sensor may be located either in the engine compartment or strapped to the ECM harness under the dash panel.

Other than checking for loose hoses and electrical connections, the only service required of these sensors is replacement should diagnosis show any sensors to be faulty.

Line	Label Markings	Explanation
1	"DELCO"	Identifies Delco as manufacturer
2	"ARCL"	BROAD CAST CODE part identifier
3	"4625"	"EXTERNAL ID" number

Line	Label Markings	Explanation
1	"ARCL"	BROAD CAST CODE part identifier
2	"1613"	First four digits of 8-digit part number
3	"4624"	Last four digits of 8-digit part number

Memory Calibration Unit: Technical Service Bulletins PROM/MEMCAL - Identification Marks

File In Section: 6E - Engine Fuel & Emission

Bulletin No.: 44-65-01

Date: October, 1994

Subject: New PROM/MEMCAL Identification Markings

Models: 1995 and Prior Passenger Cars and Trucks

Note:

For the purposes of this document, the terms PROM and MEMCAL will be used interchangeably.

To simplify identification of service PROMs. a new external marking format will be implemented. Parts manufactured after Sept. 1994 will feature these new markings. This change will place the full 8-digit service part number on the PROM, in place of the old 4-digit "EXTERNAL ID" number. In the past, parts and service personnel could not identify a PROM without using a cross-reference table that matched external IDs and service numbers. In the future, the cross-reference table will not be required for PROMs; parts will be ordered directly from the number appearing on the PROM. However, the label will retain the broadcast code alpha characters to allow continued use of cross-reference charts, if so desired.

Old Marking Format:

New Marking Format:

^ Ordering the above PROM from the old marking format would require using a cross-reference chart to determine a service part number, based on the BROAD CAST CODE and EXTERNAL ID NUMBERS.

^ To order from the new format, simply combine the 2nd and 3rd lines to form an 8-digit part number that can be directly ordered from SPO (number 16134624 in the above example).

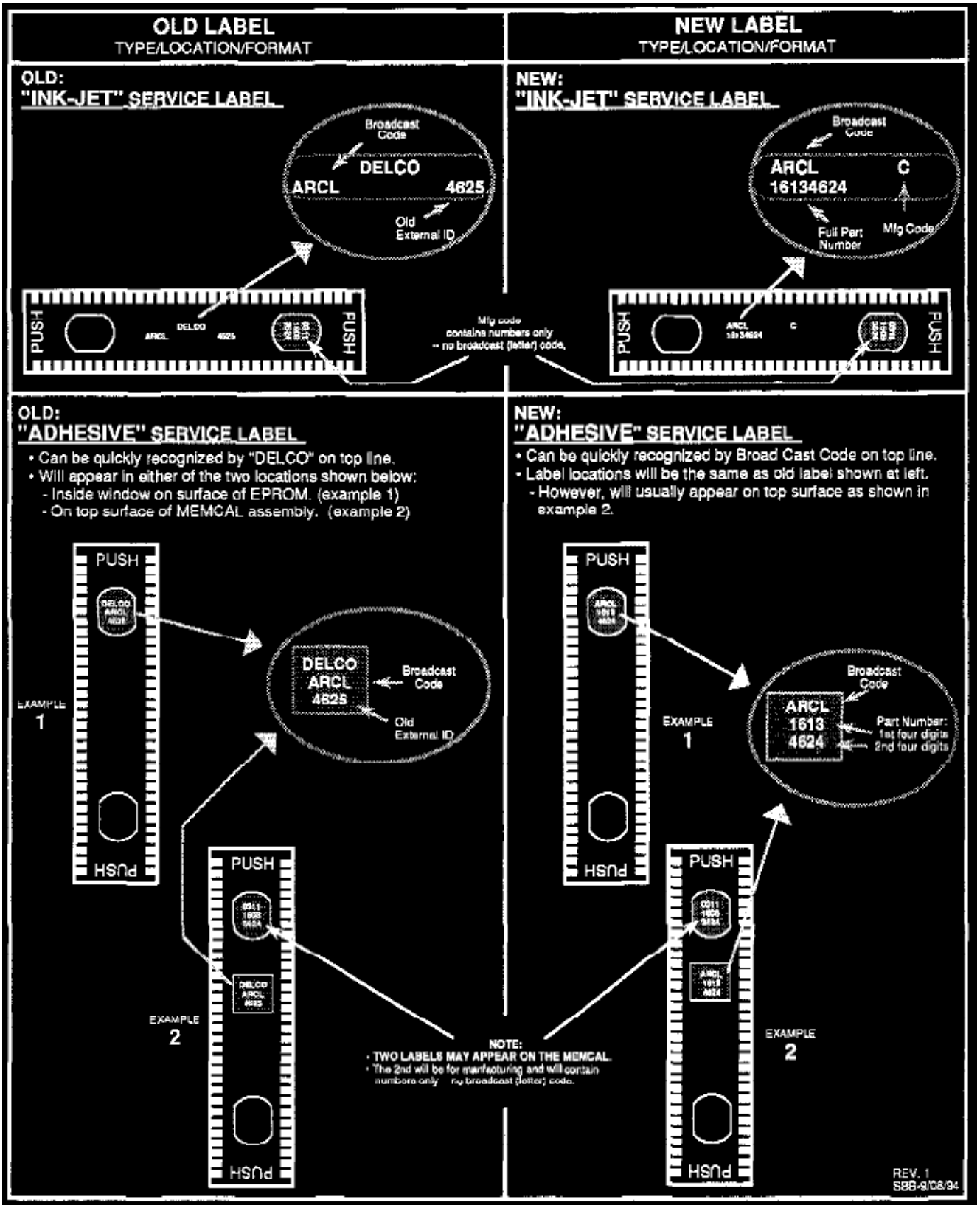
As these changes are phased into the parts inventory, it should be noted that dealers will continue to see parts with both formats for some time in the future. This is because:

^ Millions of vehicles have already been built with the old format.

^ SPO has existing stock of MEMCALs and PROMs with the old format.

^ PROMS with 7-digit part numbers (representing less than 10% of current part numbers) will continue to use the old format. The 7-digit part numbers are easily identified because they always begin with "122xxxx".

Due to manufacturing processes, more than one 8-digit part number may appear on a MEMCAL. In this event, service personnel should use the label on the exterior cover of the MEMCAL assembly. To avoid confusion, only the service label will include the BROAD CAST CODE, consisting of letter characters (I.E., ARCL).


OLD LABEL
TYPE/LOCATION/FORMAT
NEW LABEL
TYPE/LOCATION/FORMAT
OLD:
"INK-JET" SERVICE LABEL
Broadcast Code
DELCO
ARCL
4625
Old External ID
NEW:
"INK-JET" SERVICE LABEL
Broadcast Code
ARCL
C
16134624
Full Part Number
Mfg Code
PUSH
Mfg code contains numbers only -- no broadcast (letter) code.
OLD:
"ADHESIVE" SERVICE LABEL
• Can be quickly recognized by "DELCO" on top line.
• Will appear in either of the two locations shown below:
- Inside window on surface of EPROM. (example 1)
- On top surface of MEMCAL assembly. (example 2)
NEW:
"ADHESIVE" SERVICE LABEL
• Can be quickly recognized by Broad Cast Code on top line.
• Label locations will be the same as old label shown at left.
- However, will usually appear on top surface as shown in example 2.
EXAMPLE 1
DELCO
ARCL
4825
Broadcast Code
Old External ID
ARCL
1613
4624
Part Number: 1st four digits 2nd four digits
EXAMPLE 2
NOTE:
• TWO LABELS MAY APPEAR ON THE MEMCAL.
• The 2nd will be for manfeaturing and will contain numbers only -- no broadcast (letter) code.
REV. 1
SBB-9/06/94

CHANGES TO MEMCAL/PROM LABELING FORMATS

^ MEMCALs may use either INK-JET or ADHESIVE labels, as shown.

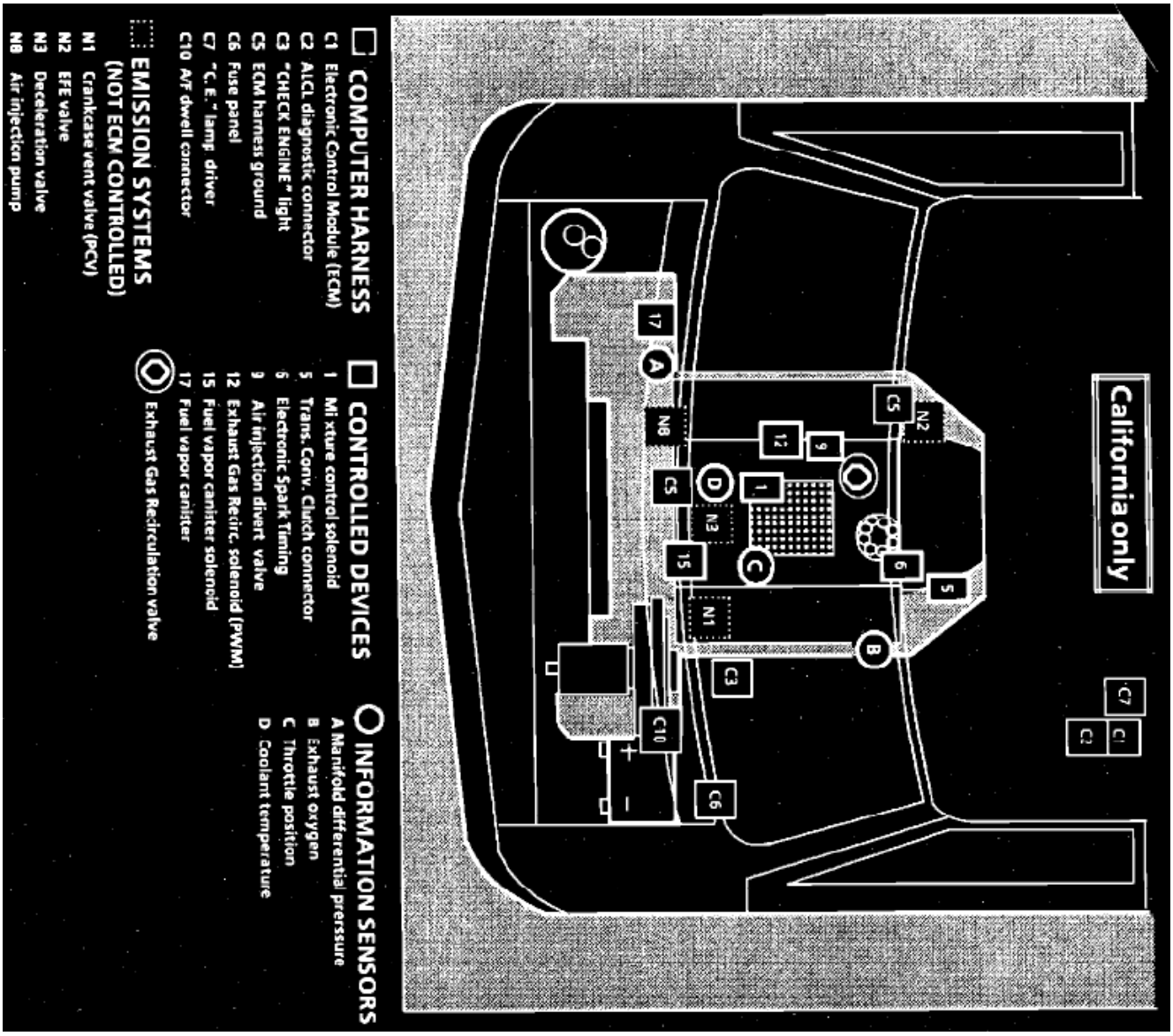
^ PROMs will always use ADHESIVE labels with the same format as shown for MEMCALs. These changes will become effective on parts manufactured after 10/94.

Engine	Year	Resistance (ohms)
1.9L	1982-85	20 MINIMUM
All others	1981-87	10 MINIMUM

Mixture Control Solenoid: Specifications

IDLE CONTROL SOLENOID - CARBURETTED ENGINES

On some engines, the ECM will will be damaged if the resistance of the mixture control solenoid is less than specified.

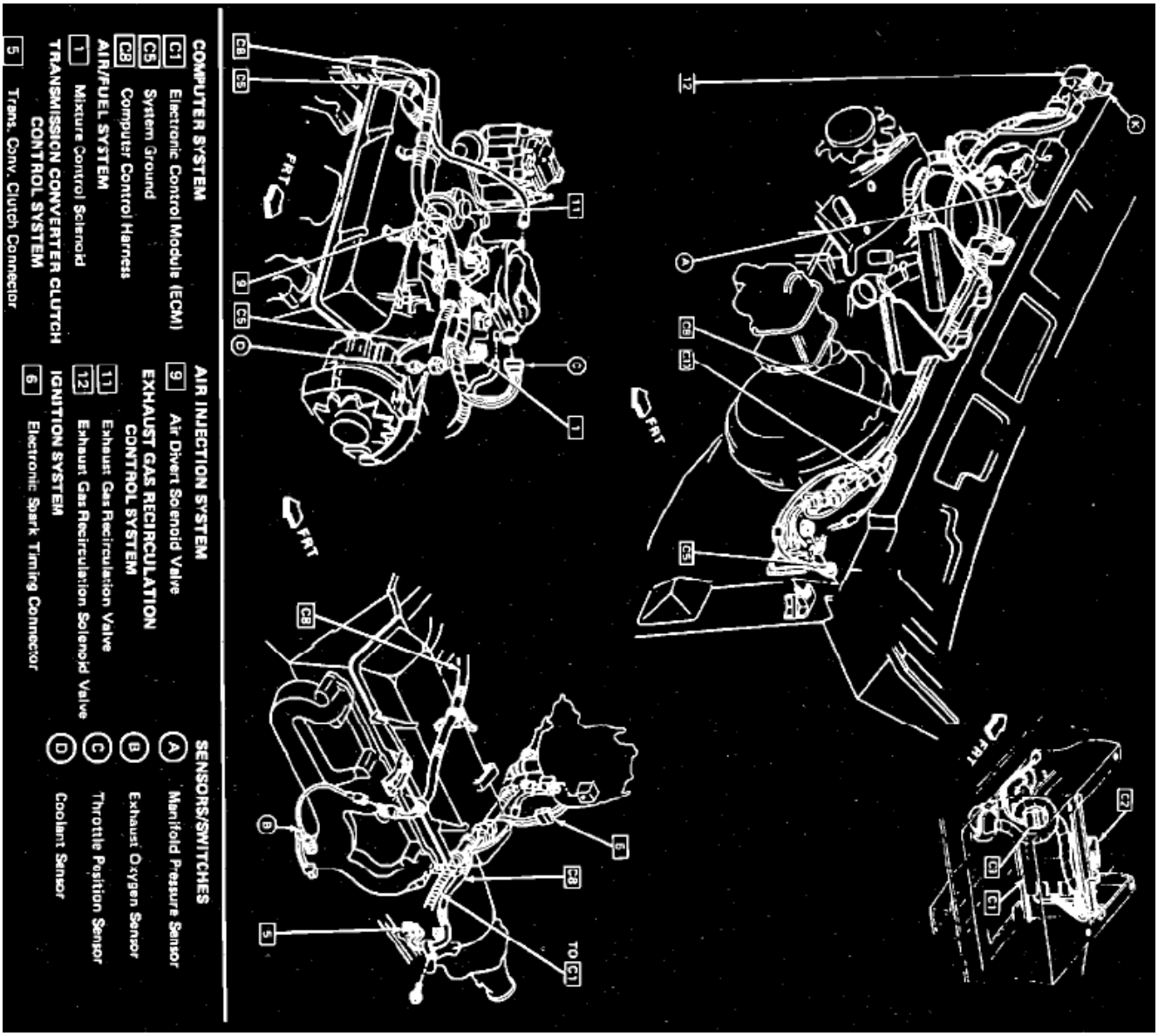


Mixture Control Solenoid: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Mixture Control Solenoid: Locations Except California

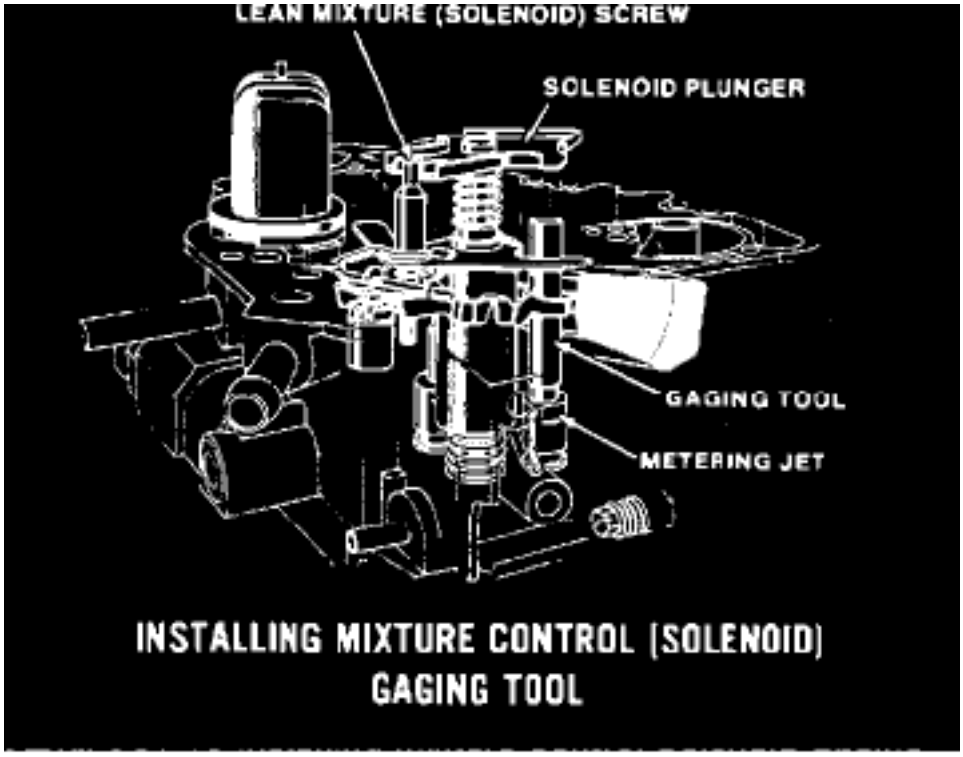
Engine Components.

On Carburetor

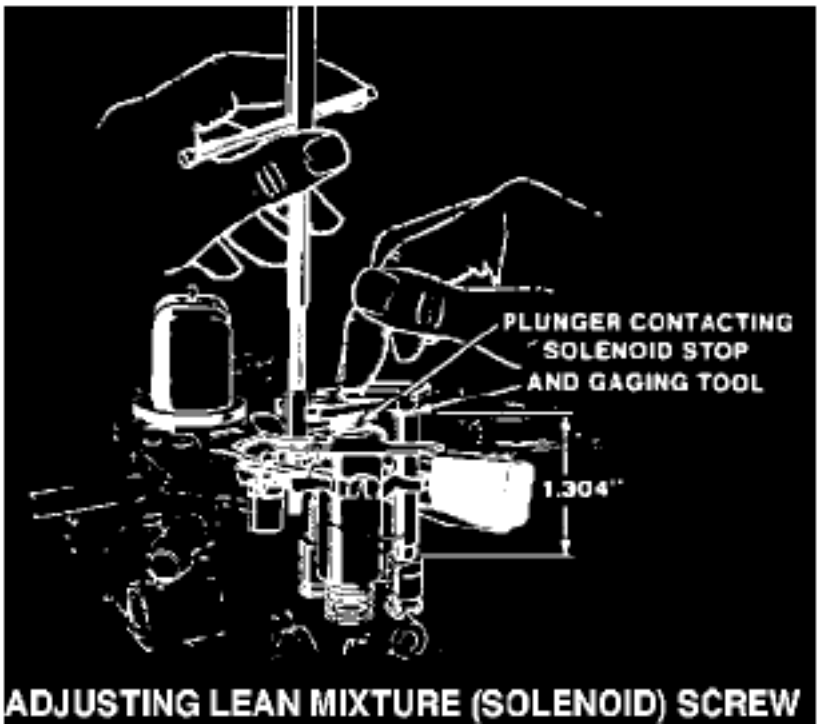
Applicable to: 1985 G Series w/V8

Mixture Control Solenoid: Description and Operation

Fuel flow through the carburetor idle/main circuit is controlled by MC solenoid controlled metering rods. The MC solenoid controls air/fuel mixtures by allowing more or less fuel to flow through the carburetor. The ECM controls MC solenoid operation by completing or breaking the solenoid ground circuit. When the MC solenoid is energized (down position), fuel flow is reduced, providing leaner mixtures. When the solenoid circuit is open (up position), more fuel is allowed to flow, providing richer mixtures. The ECM cycles the MC solenoid ``on and off'' at a fixed rate of 10 times per second, but varies the amount of time that the solenoid is energized per cycle (dwell period) to control air/fuel mixture.



INSTALLING MIXTURE CONTROL (SOLENOID) GAGING TOOL



ADJUSTING LEAN MIXTURE (SOLENOID) SCREW

Mixture Control Solenoid: Adjustments

1. Remove air horn, mixture control solenoid plunger, air horn gasket and plastic filler block, using normal service procedures.

2. Remove throttle side metering rod. Install mixture control solenoid gaging Tool JD-33815-1, BT-8253-A, or equivalent, over the throttle side

metering jet rod guide, and temporarily reinstall the solenoid plunger into the solenoid body.

Installing Mixture Control Solenoid Gauging Tool

Adjusting Lean Mixture Solenoid Screw

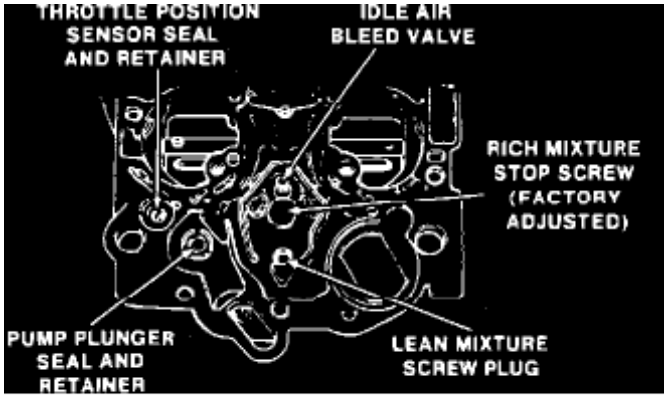
3. Holding the solenoid plunger in the DOWN position, use Tool JD-28696-10, BT-7928, or equivalent, to turn lean mixture (solenoid) screw

counterclockwise until the plunger breaks contact with the gaging tool. The adjustment is correct when the solenoid plunger is contacting BOTH the SOLENOID STOP and the GAGING TOOL. If the total difference in adjustment required less than 3/4 turn of the lean mixture (solenoid) screw, the original setting was within the manufacture's specifications.

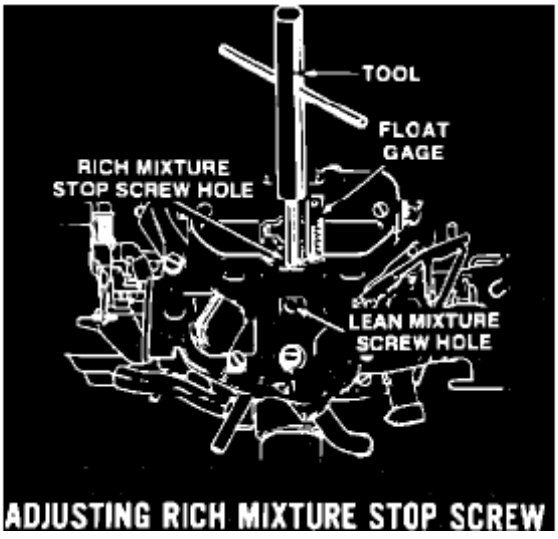
4. Remove solenoid plunger and gaging tool, reinstall metering rod and plastic filler block.

5. Invert air horn and remove rich mixture stop screw and rich authority adjusting spring from bottom side of air horn, using Tool JD-28696-4,

BT-7967A or equivalent.


THROTTLE POSITION SENSOR SEAL AND RETAINER
IDLE AIR BLEED VALVE
RICH MIXTURE STOP SCREW (FACTORY ADJUSTED)
PUMP PLUNGER SEAL AND RETAINER
LEAN MIXTURE SCREW PLUG

LEAN MIXTURE (SOLENOID) SCREW PLUG
RICH MIXTURE STOP SCREW PLUG LOCATION


TOOL
FLOAT GAGE
RICH MIXTURE STOP SCREW HOLE
LEAN MIXTURE SCREW HOLE
ADJUSTING RICH MIXTURE STOP SCREW

Removing Rich Mixture Stop Screw

Removing Lean Mixture & Rich Mixture Stop Screws

6. Remove lean mixture screw plug and rich mixture stop screw plug from air horn using a suitably sized punch.

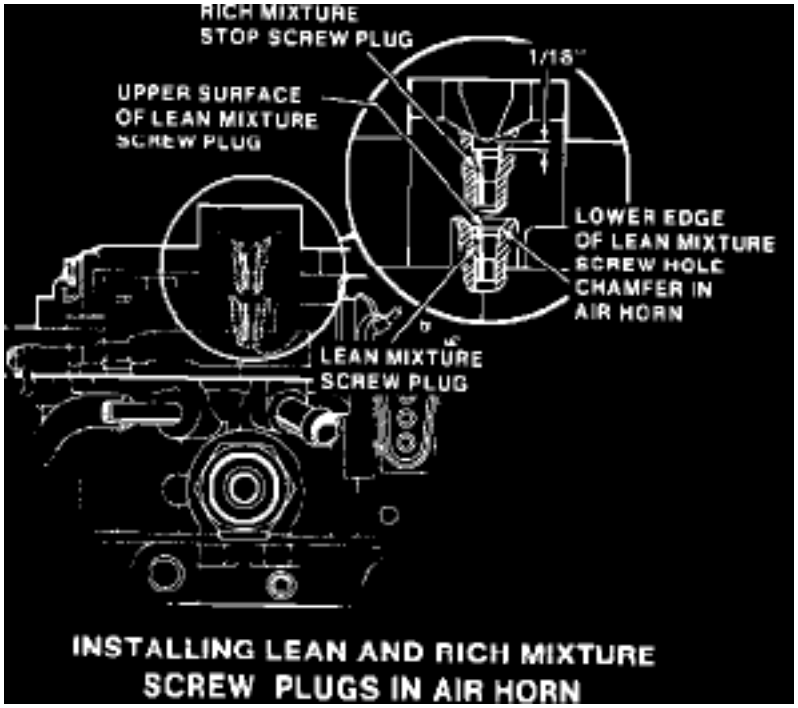
7. Reinstall rich mixture stop screw and rich authority adjusting spring in air horn and bottom lightly, then back screw out 1/4 turn.

8. Reinstall air horn gasket, mixture control solenoid plunger and air horn to carburetor.

Adjusting Rich Mixture Stop Screw

9. Insert external float gauge in vent hole and with TOOL JD-9789-130, BT-7220 or equivalent , adjust rich mixture stop screw to obtain 4/32" total

plunger travel.



Installing Lean & Rich Mixture Stop Screw Plugs

10. With solenoid plunger travel correctly set, install plugs (supplied in service kits) in the air horn, as follows:

a. Install plug, hollow end down, into the access hole to lean mixture solenoid screw and use suitably size punch to drive plug into the air horn

until the top of the plug is even with the lower edge of the hole chamfer. Plug must be installed to retain the screw setting and to prevent fuel vapor loss.

b. Install plug, with hollow end down, over the rich mixture stop screw access hole, and drive plug into place so that the top of the plug is 1/16"

below the surface of the air horn casting. Plug must be installed to retain screw setting.

Oxygen Sensor: Technical Service Bulletins RTV Sealants - Use on Engines With Oxygen Sensors

NUMBER: 86-B-28

GROUP: 6 - Gasoline Engine

DATE: March, 1986

SUBJECT: RTV (AEROBIC SEALANTS) AND ANAEROBIC SEALANTS FOR ENGINES EQUIPPED WITH OXYGEN SENSORS

MODELS: 1981-86 C, K, G, S, T, M, AND CABALLEROS WITH YF5 CALIFORNIA EMISSIONS 1985-86 S, T, AND M WITH 2.5L EFI AND NA

Incorrect usage of RTV sealants (cure in the presence of air) may cause damage to vehicle components such as oxygen sensors. This is caused by silica particles collecting on the oxygen sensor and contaminating the sensor. The correct application for RTV sealants is listed in the WDDGM parts book. The correct RTV sealants to use on engines in GMC Trucks are part numbers 1052914 or 1052917 (black) or part number 1052915 (clear). Red RTV sealant, part number 1052366, is for use on rear axle differential covers only, as it contains silica. Anaerobic sealers (cure without the presence of air) part numbers 1052756, 1052943, and 1052942 are also used to seal the rear main bearing cap to the block on engines used in GMC Trucks. See the chart below for a description of General Motors service approved RTV silicone and anaerobic sealers.

GENERAL MOTORS SERVICE APPROVED RTV SILICONE SEALANTS

Part Name Color Part Number Size Application

GMS (Type B) Black 1052914 300 ml. Caulker All Light

1052917 3 oz. Tube Duty Engines Except 2.5L

GMS (Type A) Clear 1052915 300 ml. Caulker 2.5L 4 Cylinder

GMS Red 1052366 3 oz. Tube Rear Axle Usage Only

GENERAL MOTORS SERVICE APPROVED ANAEROBIC SEALANTS

Part Name Part Number Size Application

Loctite (R) Gasket Maker 1052942 6 ml. Engine Anaerobic Applications

1052943 50 ml.

1052756 6 ml.

Loctite (R) Transmission Case Cover 1052756 6 ml. Transmission Case Covers

Sealant

Loctite (R) Trim Bonding Adhesive 1052621 4 gm. Trim, Super Glue

Loctite (R) Pipe Sealant w/Teflon 1052080 50 ml. Pipe Sealant

Loctite (R) Thread Locking Kit 1052624 10 ml. Thread Locking, Retaining Compound

Loctite (R) Inside Mirror Adhesive Kit 1052369 0.4 cc. Inside Rear View Mirror

GENERAL MOTORS OTHER APPROVED SEALANTS

Part Name Part Number Application

Gasket Sealing Compound 1050026 Gasket Sealing

Adhesive Caulking Kit 9636067 Windshield, Back Glass, Anywhere Urethane Based Sealer Is Required

Oxygen Sensor: Technical Service Bulletins Oxygen Sensors - Silica Contamination

Model Year: 1981

Bulletin No: 81-I-37

File In Group: 60

Number: 11

Date: Feb. 81

Subject: Silica Contamination of Oxygen Sensors and Gelation of Oil.

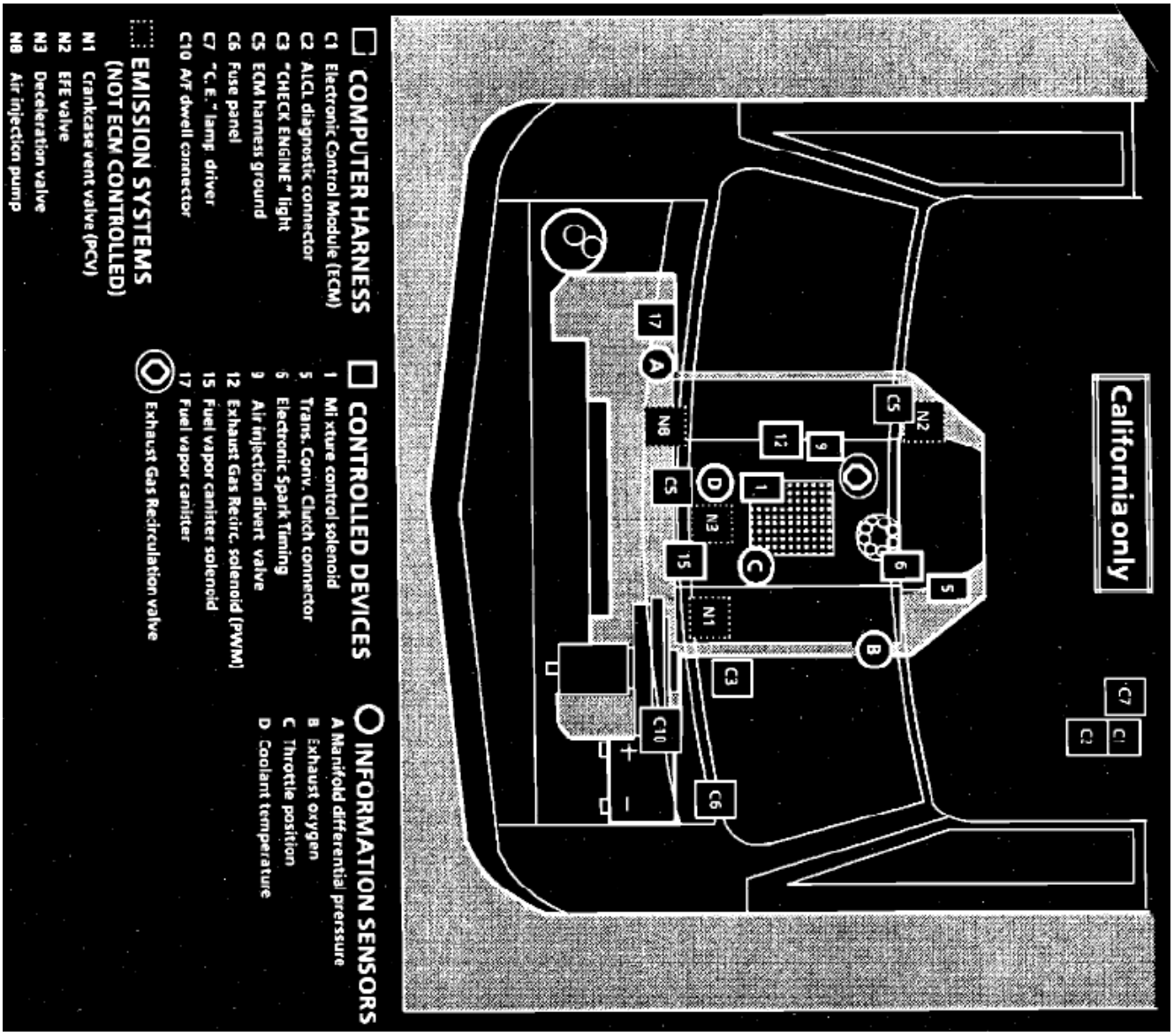
Models Affected: All

Oxygen sensor performance can deteriorate if certain RTV silicone gasket materials are used. Other RTV's when used with certain oils, may cause gelation of the oil. The degree of performance severity depends on the type of RTV and application of the engine involved.

Therefore, when repairing engines where this item is involved, it is important to use either cork composition gaskets or RTV silicone gasket material approved for such use. GMS (General Motors Sealant) or equivalent material can be used. GMS is available through GMPD with the following part numbers:

1052366 3 oz.

1052434 10.14 oz.

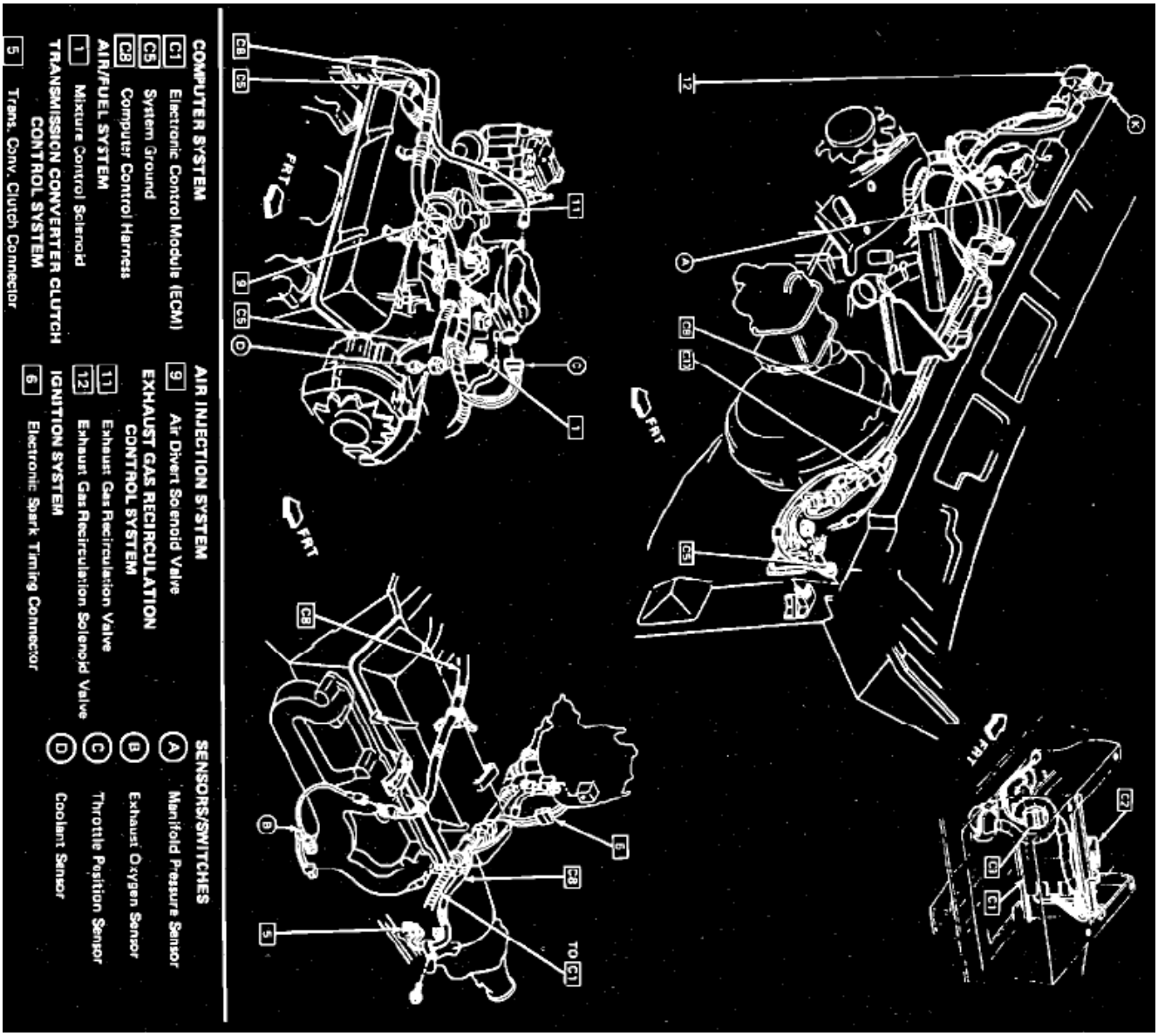


Oxygen Sensor: Locations California

Underhood & Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Oxygen Sensor: Locations Except California

Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

Oxygen Sensor: Description and Operation

The exhaust oxygen sensor is located in the exhaust system and monitors oxygen content in the exhaust gas stream. Varying concentration of oxygen in the exhaust gas causes the O2 sensor to produce a varying voltage output. By monitoring the O2 sensor output voltage, the ECM can determine the amount of oxygen in the exhaust gas and adjust the air/fuel mixture accordingly.

Rich air/fuel ratio = low oxygen content and high signal output (0.45-1.0 volt) Lean air/fuel ratio = high oxygen content and low signal output (below 0.45 volt).

Oxygen Sensor: Service and Repair

The oxygen sensor has a permanently attached pig-tail and connector. This pig-tail should not be removed, since removal will affect proper operation of oxygen sensor.

1. Disconnect electrical connector from oxygen sensor.

2. Using a suitable wrench, carefully remove sensor from exhaust manifold or pipe. The oxygen sensor may be difficult to remove when engine temperature is below 120°F. Use caution, since excessive force may damage threads in exhaust manifold or pipe.

3. If new sensor is being used, install sensor into manifold or pipe.

4. If old sensor is being reused, coat threads with anti-seize compound, Part No. 5613695 or equivalent, then install into manifold or pipe.

5. Torque oxygen sensor to 30 ft. lbs., then reconnect electrical connector.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Computers and Control Systems > Relays and Modules - Computers and Control Systems > Electronic Spark Timing <--> [Electronic Spark Control Module] > Component Information > Locations > Typical Electronic Spark System (ESC)

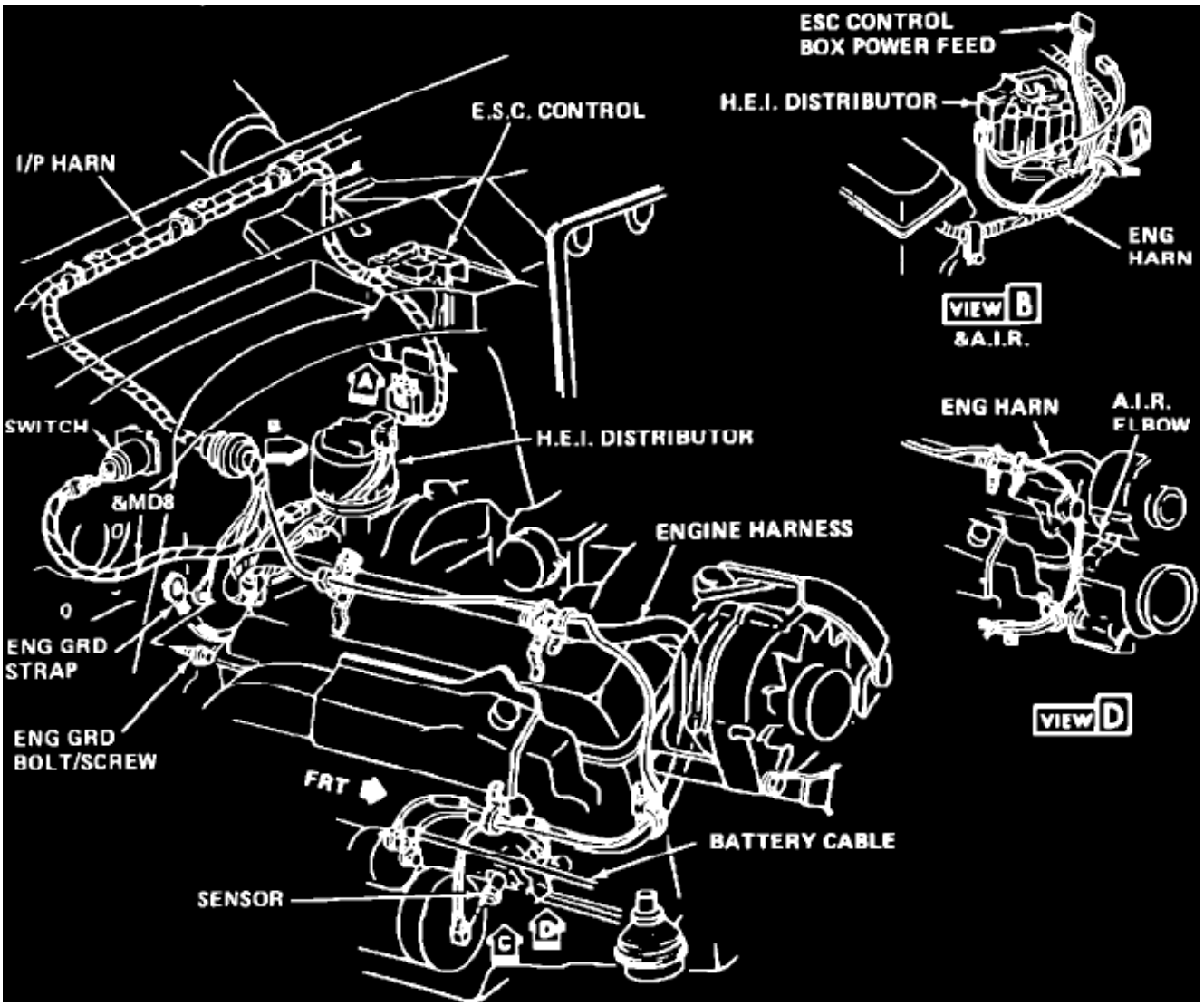


Fig. 46 Typical Electronic Spark System (ESC)

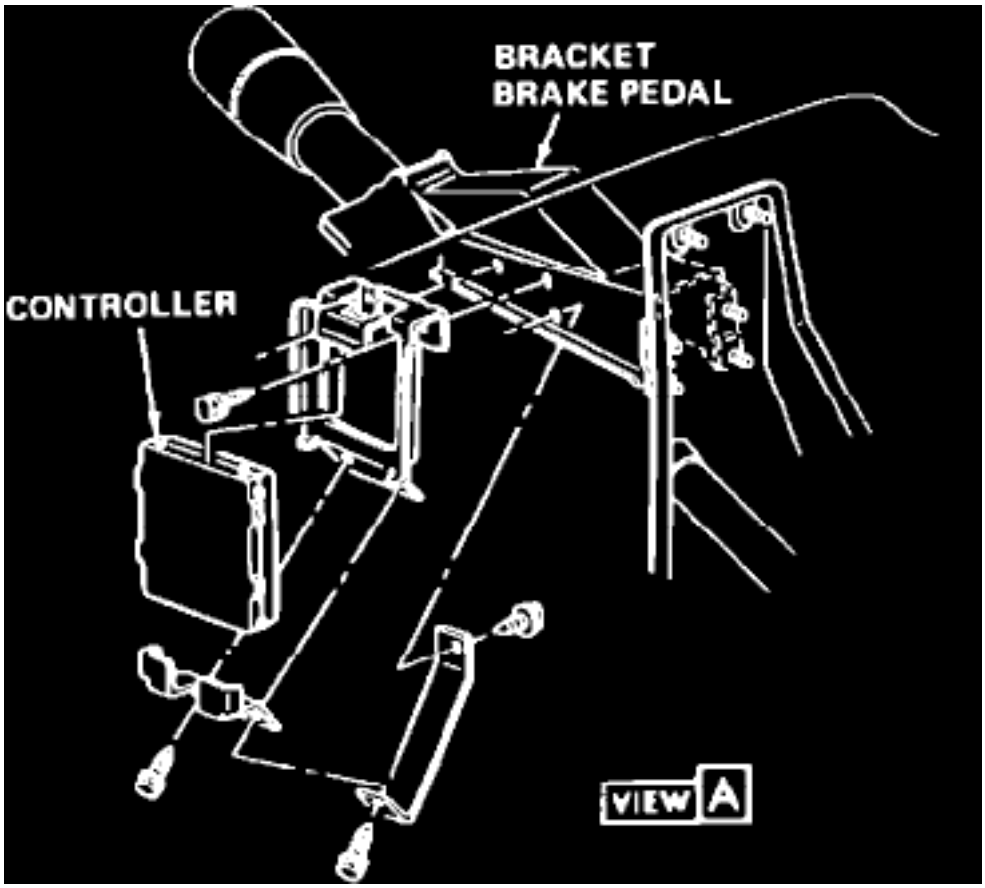
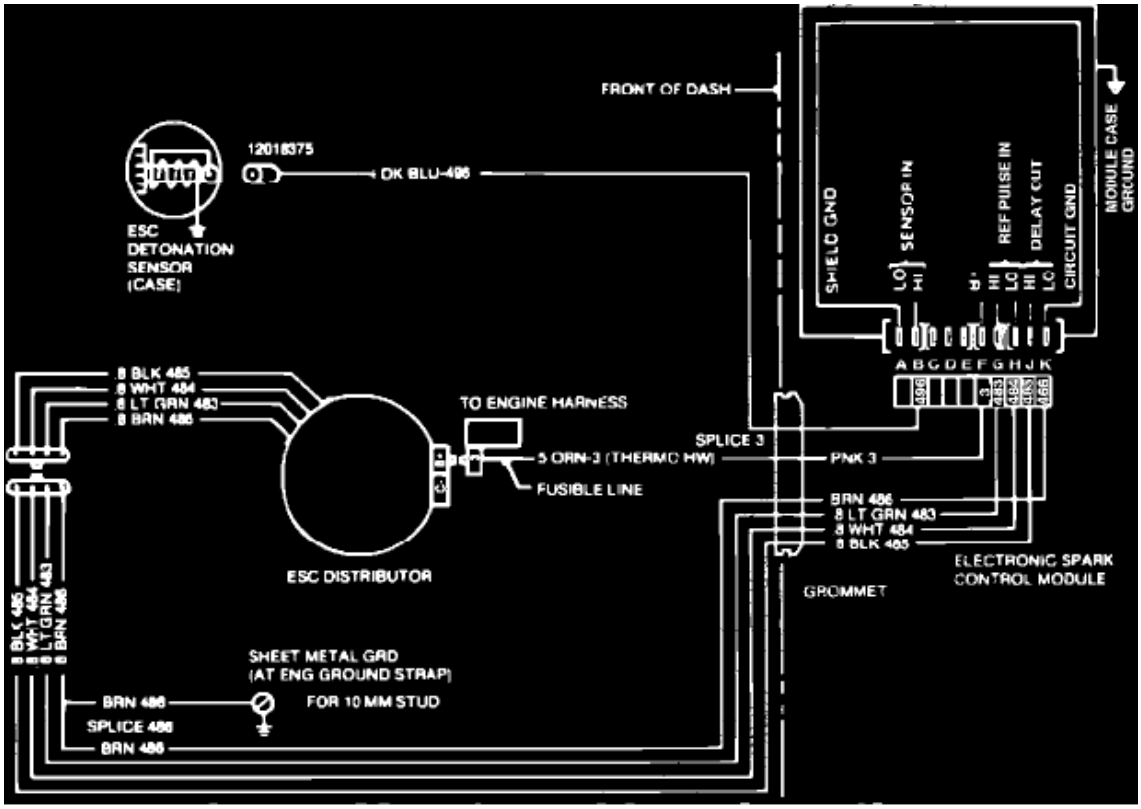
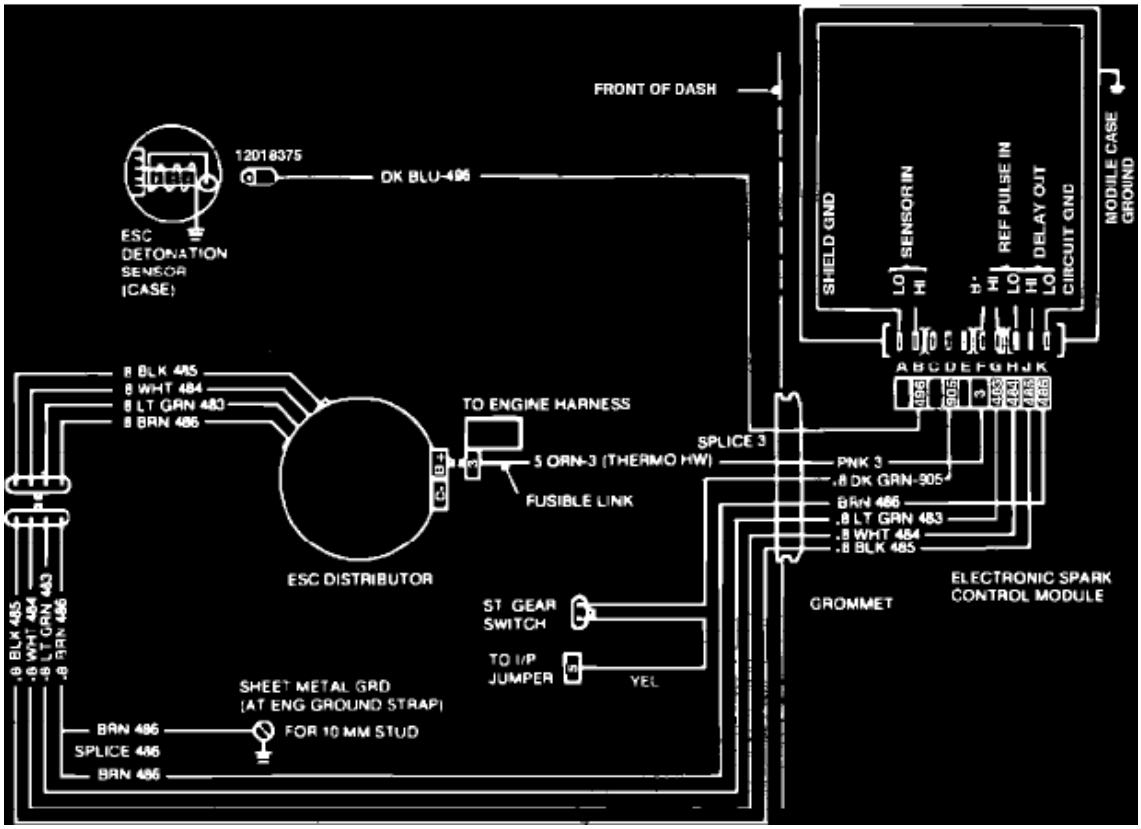


Fig. 47 Typical ESC Controller





Electronic Spark Timing: Testing and Inspection

Use the following procedures to diagnose ESC system malfunctions only. To diagnose general ignition system malfunctions, refer to ``High Energy Ignition (HEI) System Diagnosis.''

Fig. 5 ESC system wiring schematic. 1984-86 models w/manual 4 speed top loader transmission

Fig. 6 ESC system wiring schematic. 1984-86 models w/manual 3 & 4 speed side loader transmission

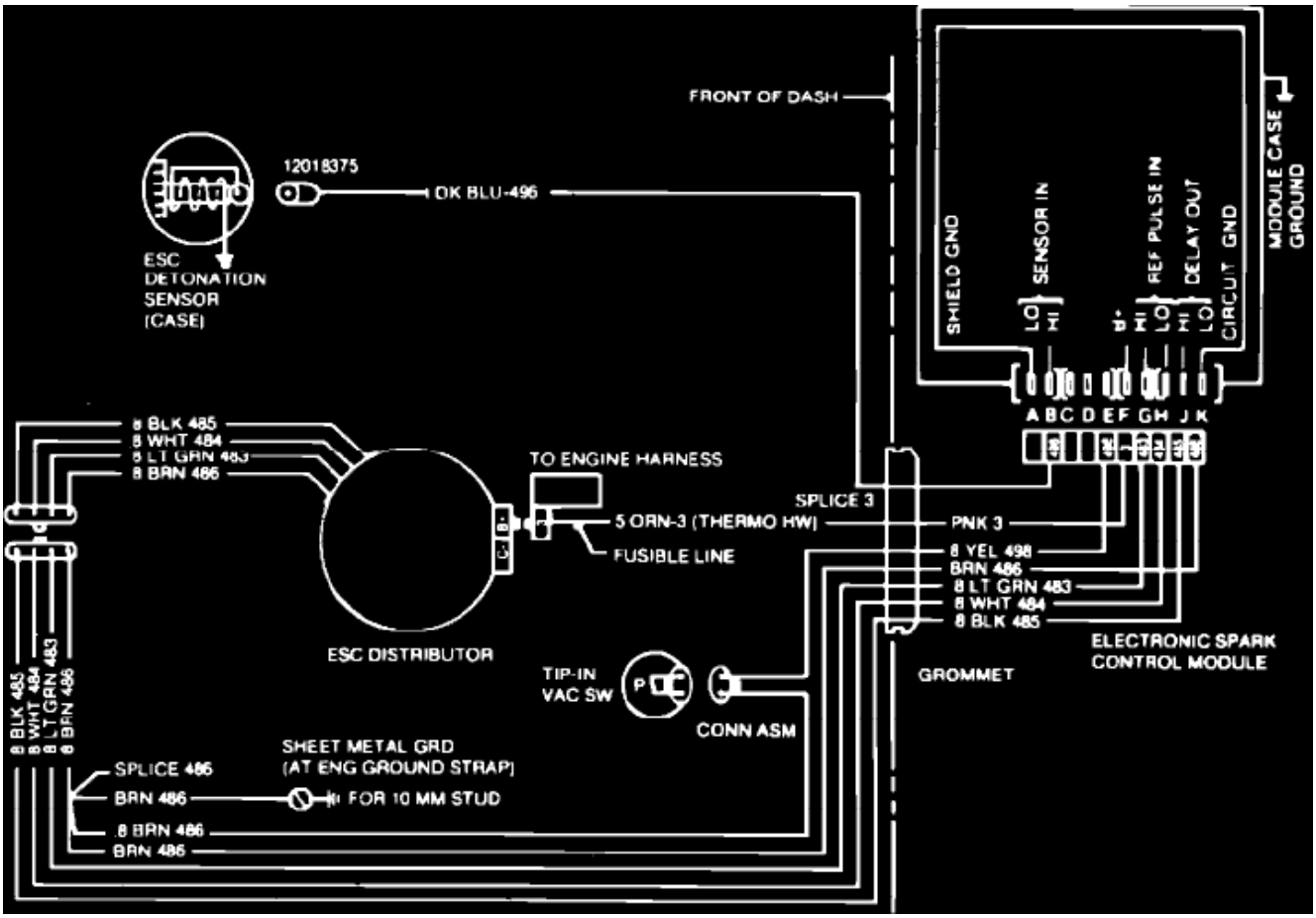


Fig. 7 ESC system wiring schematic. 1984-86 models w/auto. trans.

1984-86 MODELS

Engine Cranks But Will Not Start

1. Check for spark at at the ends of at least 2 spark plug wires using tester ST-125 or equivalent. If spark is observed, malfunction is not in ignition system.

2. If no spark is observed, disconnect 4 pin connector to distributor, connect jumper wire between pins A and C on distributor side of connector, Figs. 5, 6 and 7, and attempt to start engine. If engine starts, proceed to step 3. If engine does not start, proceed as follows:

a. Remove jumper wire and reconnect 4 pin connector to distributor. Turn on ignition and measure voltage at pins F and K of controller 10 pin

connector. If voltage is less than 11.6 volts, check feed circuit and repair as needed.

b. Set voltmeter on 2 volt scale and measure voltage between pins J and K of 10 pin connector while cranking engine. If reading is .75 volts or

greater, ESC system is satisfactory.

c. Set voltmeter on 2 volt scale and measure voltage between pins G and H of 10 pin connector while cranking engine. If reading is .20 volt or

greater, controller is defective. If reading is less than .20 volt, pole piece is defective.

3. Stop engine and remove jumper wire from distributor.

4. Connect suitable high resistance test lamp between distributor TACH terminal and ground, then turn on ignition. If test lamp lights, proceed to step 6.

5. If lamp does not light at TACH terminal, connect lamp between BAT terminal and ground and turn on ignition. If lamp does not light, repair feed circuit to ignition.

6. Crank engine with test lamp connected between distributor TACH terminal and ground. If test lamp flickers, system is satisfactory.

7. If test lamp does not flicker as engine is cranked, connect lamp between BAT terminal and pin A on distributor side of 4 pin ESC connector, then tap on coil. If coil makes a clicking noise when tapped, pole piece is defective.

8. If coil does not click, remove distributor cap an disconnect and reconnect pole piece electrical connector. If coil still does not click when tapped, ignition module is defective.

Poor Engine Performance

1. Disconnect distributor 4 pin connector, connect pins A and C on distributor side of connector with jumper wire, and road test vehicle.

2. If engine performance is still poor, cause is not in ESC system. If proper engine performance is restored by disconnecting ESC controller from distributor, remove jumper wire, reconnect 4 pin connector and proceed to next step.

3. Disconnect 10 pin connector from ESC controller, inspect terminals for proper contact, shots and opens, repair as needed, then recheck system operation.

4. If problem persists, disconnect 10 pin connector and measure resistance between pins B and K in connector. Reading should be 98-99 Kohms.

5. If resistance is not as specified, disconnect electrical connector from knock sensor and measure resistance between sensor terminal and ground. If resistance is 98-99 ohms, repair wiring between

knock sensor and controller. If resistance is not 98-99 Kohms, knock sensor is defective.

6. Reconnect 10 pin connector to controller and measure voltage between pins F and K with ignition on. If voltage reading is less than 11.6 volts repair feed circuit as needed.

7. Set voltmeter on 20 volt AC scale and measure voltage between connector pins H and K with ignition on. If reading is less than .20 volt, inspect system wiring and repair as needed. If reading is greater than .20 volt, ensure all connectors are properly seated, then road test vehicle. If problem persists, replace ESC controller.

Engine Detonation

1. Inspect connector and wiring to knock sensor and repair as needed.

2. Connect suitable spark advance tester to engine, run engine until it reaches normal operating temperature and set engine to run at a minimum of 1200 RPM, then observe ignition timing while tapping on exhaust manifold. If ignition timing retards when manifold is tapped, ESC system is operating properly.

3. Stop engine, disconnect 10 pin connector from ESC controller and measure resistance between pins B and K of connector. If resistance is not 98-99 ohms, proceed to step 5.

4. Measure resistance between pins H and K in connector. If resistance is 14-16 ohms, replace controller. If resistance is not 14-16 ohms, repair wiring to controller.

5. Disconnect electrical connector from knock sensor and measure voltage at sensor terminal with engine running at 2000 RPM. If reading is not .08 volt or more, knock sensor is defective.

6. Stop engine. If knock sensor voltage output is satisfactory, check wiring between knock sensor and terminal B of controller and between controller terminal K and ground and repair as needed.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Computers and Control Systems > Relays and Modules - Computers and Control Systems > Engine Control Module > Component Information > Technical Service Bulletins > Engine Controls - Aftermarket Accessory Usage

Engine Control Module: Technical Service Bulletins Engine Controls - Aftermarket Accessory Usage

INFORMATION

Bulletin No.: 04-06-04-054B

Date: November 18, 2010

Subject: Info - Non-GM Parts and Accessories (Aftermarket)

Models:

2011 and Prior GM Passenger Cars and Trucks

Supercede: This bulletin is being revised to add model years and update to the new U.S. Fixed Operation Manager (FOM) and Canada Warranty Manager (WM) names. Please discard Corporate Bulletin Number 04-06-04-054A (Section 06 - Engine/Propulsion System).

The recent rise and expansion of companies selling non-GM parts and accessories has made it necessary to issue this reminder to dealers regarding GM's policy on the use and installation of these aftermarket components.

When a dealer is performing a repair under the New Vehicle Limited Warranty, they are required to use only genuine GM or GM-approved parts and accessories. This applies to all warranty repairs, special policy repairs or any repairs paid for by GM. Parts and accessories advertised as being "the same" as parts manufactured by GM, but not sold through GM, do not qualify for use in warranty repairs, special policy repairs or any repairs paid for by GM.

During a warranty repair, if a GM original equipment part is not available through GM Customer Care and Aftersales (GM CC&A;), ACDelco(R) distributors, other GM dealers or approved sources, the dealer is to obtain comparable, non-GM parts and clearly indicate, in detail, on the repair order the circumstances surrounding why non-GM parts were used. The dealer must give customers written notice, prior to the sale or service, that such parts or accessories are not marketed or warranted by General Motors.

It should also be noted that dealers modifying new vehicles and installing equipment, parts and accessories obtained from sources not authorized by GM are responsible for complying with the National Traffic and Motor Vehicle Safety Act. Certain non-approved parts or assemblies, installed by the dealer or its agent not authorized by GM, may result in a change to the vehicle's design characteristics and may affect the vehicle's ability to conform to federal law. Dealers must fully understand that non-GM approved parts may not have been validated, tested or certified for use. This puts the dealer at risk for potential liability in the event of a part or vehicle failure. If a GM part failure occurs as the result of the installation or use of a non-GM approved part, the warranty will not be honored.

A good example of non-authorized modification of vehicles is the result of an ever increasing supply of aftermarket devices available to the customer, which claim to increase the horsepower and torque of the Duramax(TM) Diesel Engines. These include the addition of, but are not limited to one or more of the following modifications:

- Propane injection

- Nitrous oxide injection

- Additional modules (black boxes) that connect to the vehicle wiring systems

- Revised engine calibrations downloaded for the engine control module

- Calibration modules which connect to the vehicle diagnostic connector

- Modification to the engine turbocharger waste gate

Although the installation of these devices, or modification of vehicle components, can increase engine horsepower and torque, they may also negatively affect the engine emissions, reliability and/or durability. In addition, other powertrain components, such as transmissions, universal joints, drive shafts, and front/rear axle components, can be stressed beyond design safety limits by the installation of these devices.

General Motors does not support or endorse the use of devices or modifications that, when installed, increase the engine horsepower and torque. It is because of these unknown stresses, and the potential to alter reliability, durability and emissions performance, that GM has adopted a policy that prevents any UNAUTHORIZED dealer warranty claim submissions to any remaining warranty coverage, to the powertrain and driveline components whenever the presence of a non-GM (aftermarket) calibration is confirmed - even if the non-GM control module calibration is subsequently removed. Refer to the latest version of Bulletin 09-06-04-026 (V8 Gas Engines) or 06-06-01-007 (Duramax(TM) Diesel Engines) for more information on dealer requirements for calibration verification.

These same policies apply as they relate to the use of non-GM accessories. Damage or failure from the use or installation of a non-GM accessory will not be covered under warranty. Failure resulting from the alteration or modification of the vehicle, including the cutting, welding or disconnecting of the vehicle's original equipment parts and components will void the warranty.

Additionally, dealers will NOT be reimbursed or compensated by GM in the event of any legal inquiry at either the local, state or federal level that

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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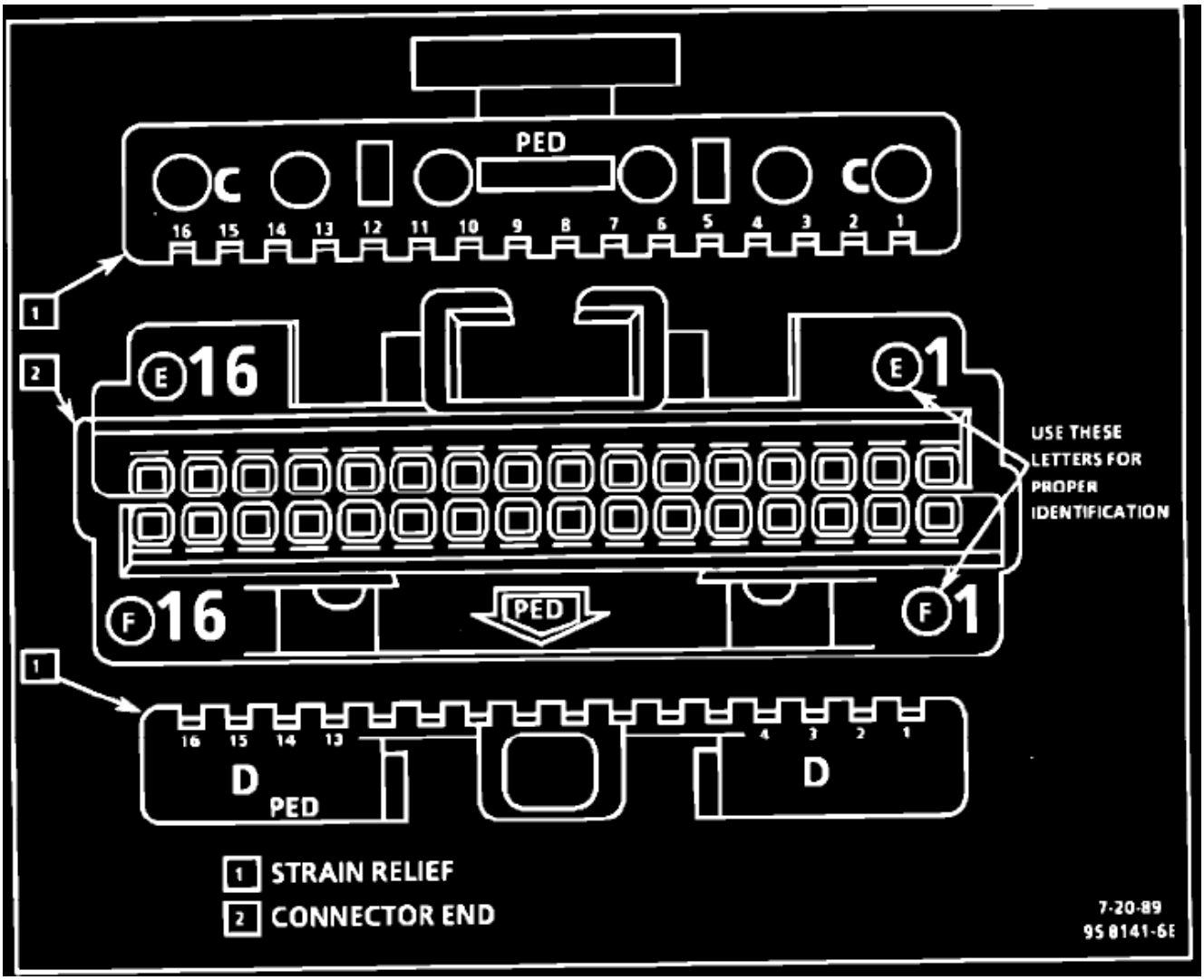
results from the alteration or modification of a vehicle using non-GM approved parts or accessories.

Dealers should be especially cautious of accessory companies that claim the installation of their product will not void the factory warranty. Many times these companies have even given direction on how to quickly disassemble the accessory in an attempt to preclude the manufacturer from finding out that is has been installed.

Any suspect repairs should be reviewed by the Fixed Operations Manager (FOM), and in Canada by the Warranty Manager (WM) for appropriate repair direction. If it is decided that a goodwill repair is to be made on the vehicle, even with the installation of such non-GM approved components, the customer is to be made aware of General Motors position on this issue and is to sign the appropriate goodwill documentation required by General Motors.

It is imperative for dealers to understand that by installing such devices, they are jeopardizing not only the warranty coverage, but also the performance and reliability of the customer's vehicle.

Disclaimer



Engine Control Module: Technical Service Bulletins ECM - Packard 32 Way Connector Identification

Number: 90-56-8

Section: 8

Date: September 1989

Corporate Bulletin No.: 916521R

Subject: PACKARD 32 WAY CONNECTOR IDENTIFICATION

Model and Year: 1980-90 A, B, F, G, J, L, W, Y CARS AND ALL TRUCKS WITH GMP4 ECM APPLICATIONS

TO: ALL CHEVROLET DEALERS

This bulletin serves to clarify the labeling of the Packard 32 way connectors used on the GMP4 under dash ECMS.

Currently a common strain relief is used in both the C-D 32 pin and the E-F 32 pin connectors. To properly identify these connectors, the strain reliefs must be removed. Use the lettering on the connector as shown on figure.

The colors used at this time for the 32 pin E-F connector are yellow, mint green or orange.

This updates any previous information released concerning identification that indicates any of these colors as being C & D connectors, found in the 6E and 8D Sections of the affected Service Manuals.

Engine Control Module: Technical Service Bulletins ECM/PCM - Damaged and/or Misdiagnosed

Number: 91-384-6E

Section: 6E

Date: AUGUST 1991

Corporate Bulletin No.: 176503

Subject: DAMAGED ECM/PCM AND/OR MIS-DIAGNOSED ECM/PCM SYMPTOMS DUE TO INCORRECT "TAP-TESTING" PROCEDURES

Model and Year: 1982-91 ALL PASSENGER CARS AND TRUCKS

CONDITION: Because of the intermittent nature of some Electronic Control Module (ECM) or Powertrain Control Modules (PCM) symptoms, some service technicians have been subjecting the ECM/PCM to vibration and/or shock testing. Commonly known as tap-testing, this procedure involves tapping on the ECM/PCM case, while the engine is running. It is generally accepted that if the engine or ECM/PCM falters due to the tapping, an intermittent internal ECM/PCM defect may be indicated. However, this may not always be true. If too much force is applied to the ECM/PCM during the test the following symptoms may result:

^ Immediate ECM/PCM failure.

^ ECM/PCM suffers damage which may cause a failure at a later date.

^ ECM/PCM Reset (or Glitch), creating a momentary stall, miss Service Engine Soon (SES) light and/or loss of serial data.

CAUSE: The ECM/PCM should be tapped using only the fingertips of one hand. Use of the palm, fist, or any type of tool subjects the ECM/PCM to forces that can cause both the circuit board and the outer aluminum case to flex and distort beyond design limits. The Integrated Circuits (IC) used in today's ECM/PCMs are mounted to the circuit board using a mounting process referred to as "surface technology." There are no circuit board holes for IC leads to go through. The IC leads set on pads, (28 pads or 52 pads depending on the IC) and solder is flowed around the leads to make the electrical connection to the circuit board.

^ Any flexing of the circuit board, beyond design limits, places the IC solder connections at risk of damage. Such damage may be apparent immediately, or it may appear at a future date. Circuit board deflection can occur as a result of striking the ECM/PCM, using ONLY THE PALM OF THE HAND.

^ If struck on the bottom side (the side opposite the service label), the ECM/PCM's aluminum outer case may deflect inward far enough to contact the electrical leads attached to the circuit board. Once in contact with the case the ECM/PCM electrical components will be shorted directly to ground. Although such shorting certainly has the potential to damage the ECM/PCM, it may not be permanent damage, depending on which circuit is involved. However, even if permanent damage is avoided, a short on any of the circuits will cause a disruption of normal ECM/PCM operation for the instant that the short occurs. This disruption may cause the ECM/PCM to reset (see "reset" above), creating the false impression that it is vibration sensitive or faulty. Reset is the ECM/PCM's normal way of coping with large voltage spikes. An ECM/PCM reset does not indicate that the ECM/PCM is defective or faulty, only that it is being subjected to abnormal conditions.

CORRECTION:

1. TAP THE ECM/PCM ONLY ON THE TOP SIDE (The top side is where the service label is located.)

^ This will minimize the chance of deflecting the ECM/PCM case into the electrical leads on the circuit board. The clearance between the case and the circuit board is closest on the bottom side of

the ECM/PCM.

2. TAP THE ECM/PCM USING ONLY THE FINGERTIPS - NO TOOLS.

^ To avoid excessive case deflection, avoid tapping in the center of the case. Tapping close to the edge of the ECM/PCM, especially in the corners, is best.

^ While using greater force may seem more effective, the test itself may cause the ECM/PCM to fail.

Engine Control Module: Technical Service Bulletins Engine Controls - ECM May Contain Wrong PROM

Number: 88-42

Section: 6E

Date: Sept., 1987

Subject: SERVICE REPLACEMENT ELECTRONIC MODULES (ECM) WITH PROM INSTALLED

Model and Year: 1981-88 ALL MODELS TO:

ALL CHEVROLET DEALERS

It has been brought to our attention that some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM for the vehicle.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

Engine Control Module: Technical Service Bulletins ECM - Revised Replacement Procedure

Number: 87-150

Section: 6E

Date: MAY, 1987

Subject: REVISED ECM REPLACEMENT PROCEDURE - CHART C-1

Model and Year: 1982 THROUGH 1987 ECM EQUIPPED VEHICLES

TO: ALL CHEVROLET DEALERS

The purpose of this bulletin is to introduce new ECM test procedures to reduce the possibility of multiple ECM failures on any one vehicle.

Since 1982, most ECM's have used an integrated circuit (IC) in place of separate transistors to turn "on" or "off" different components controlled by the ECM. These IC's are called quad drivers (QDR). Each QDR has four separate outputs, meaning it can turn "on" or "off" four different items independently.

A failed QDR usually results in an ECM output becoming either shorted to ground or open. Many times all four QDR output will be inoperative if just one vehicle circuit is faulty.

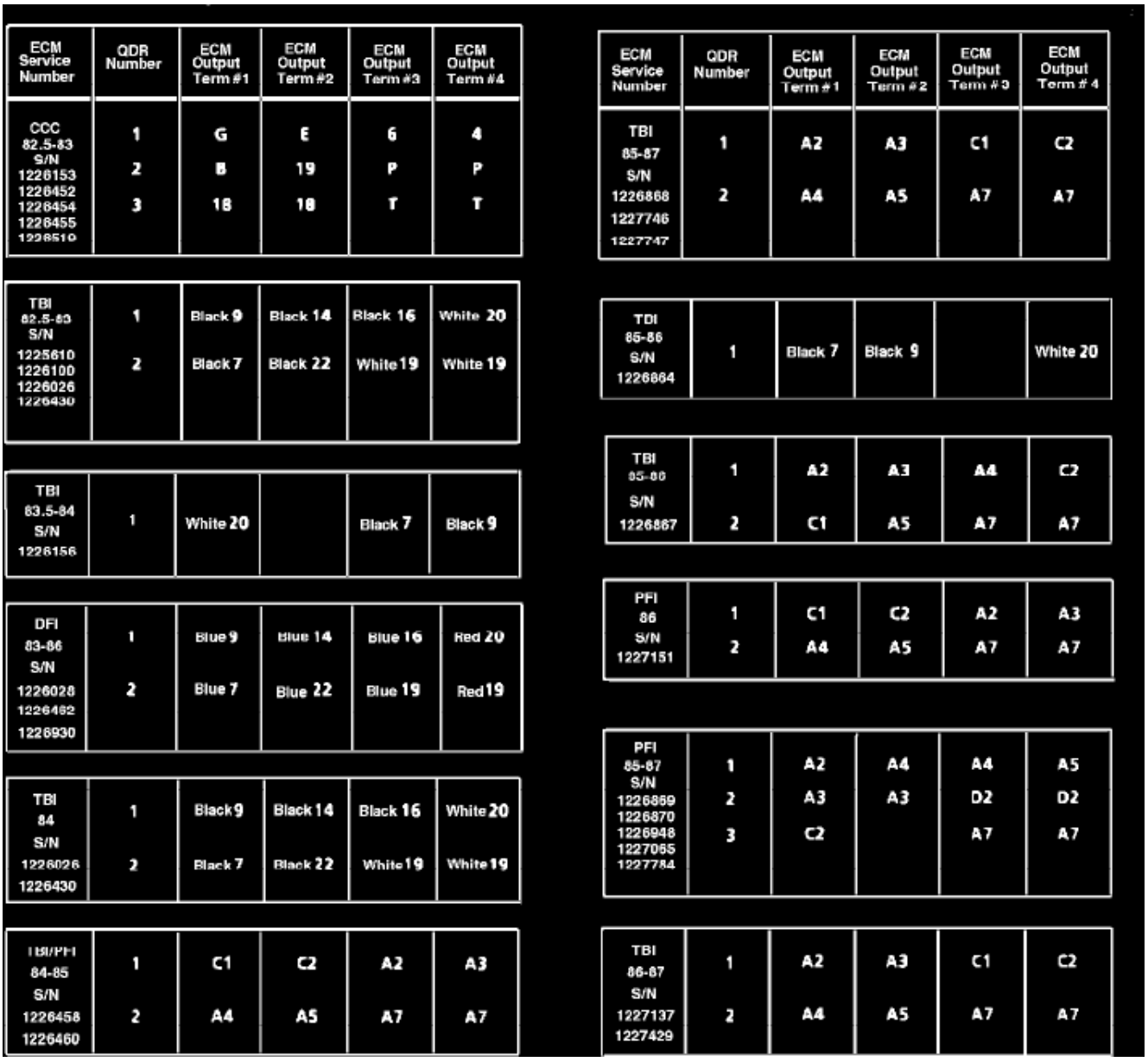
The revised diagnosis incorporates new test procedures designed to identify a damaged QDR. Once identified, the circuit must be repaired to reduce the incidence of repeat ECM failures.

This chart replaces the current service manual procedure for either:

1. Chart C-1 ECM replacement check, or

2. Any diagnostic chart where "replace ECM" is the conclusion, especially if a footnote indicates checking certain circuits for less than 20 OHM's resistance.

It is strongly suggested that this chart be used whenever an ECM replacement is indicated for 1982 through 1987 vehicles.



ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
CCC 82.5-83 S/N 1226153 1226452 1226454 1226455 1226510	1	G	E	6	4
	2	B	19	P	P
	3	18	18	T	T
TBI 82.5-83 S/N 1225610 1226100 1226026 1226430	1	Black 9	Black 14	Black 16	White 20
	2	Black 7	Black 22	White 19	White 19
TBI 83.5-84 S/N 1226156	1	White 20		Black 7	Black 9
DFI 83-86 S/N 1226028 1226462 1226930	1	Blue 9	Blue 14	Blue 16	Red 20
	2	Blue 7	Blue 22	Blue 19	Red 19
TBI 84 S/N 1226026 1226430	1	Black 9	Black 14	Black 16	White 20
	2	Black 7	Black 22	White 19	White 19
TBI/PFI 84-85 S/N 1226458 1226460	1	C1	C2	A2	A3
	2	A4	A5	A7	A7

ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
TBI 85-87 S/N 1226868 1227746 1227747	1	A2	A3	C1	C2
	2	A4	A5	A7	A7
TDI 85-86 S/N 1226864	1	Black 7	Black 9		White 20
TBI 85-86 S/N 1226867	1	A2	A3	A4	C2
	2	C1	A5	A7	A7
PFI 86 S/N 1227151	1	C1	C2	A2	A3
	2	A4	A5	A7	A7
PFI 85-87 S/N 1226869 1226870 1226948 1227065 1227784	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	C2		A7	A7
TBI 86-87 S/N 1227137 1227429	1	A2	A3	C1	C2
	2	A4	A5	A7	A7

QDR Application Chart

QDR Application Chart For CHART C-1

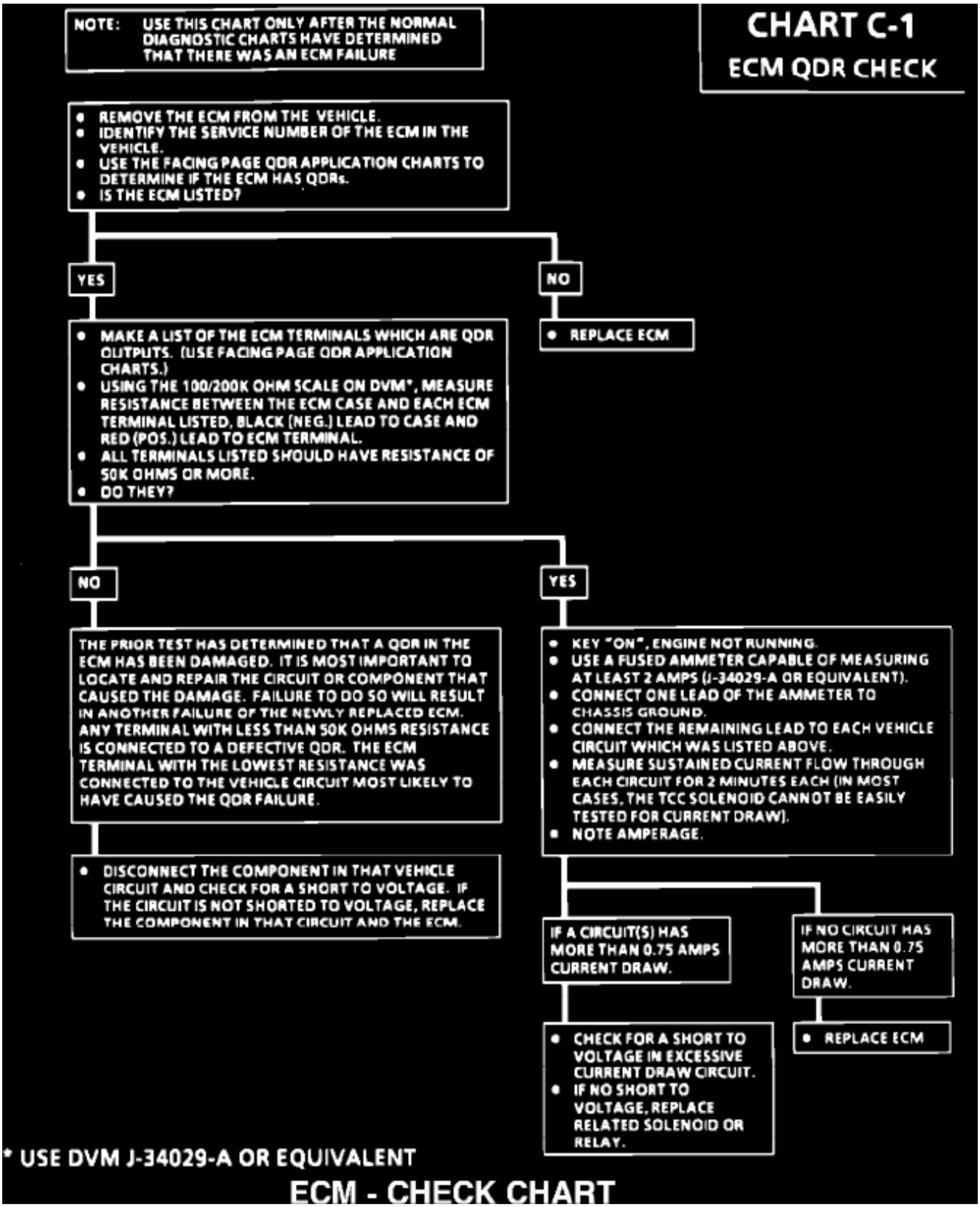
The following chart contains ECM QDR arrangement for all ECM models thru 1987.* Important Note:

^ Many 82-83 ECMs did not use QDRs, and will not appear on the chart.

^ This procedure will not work on any ECM Service Number which does not appear on the chart. (This is because such an ECM does not contain QDRs.)

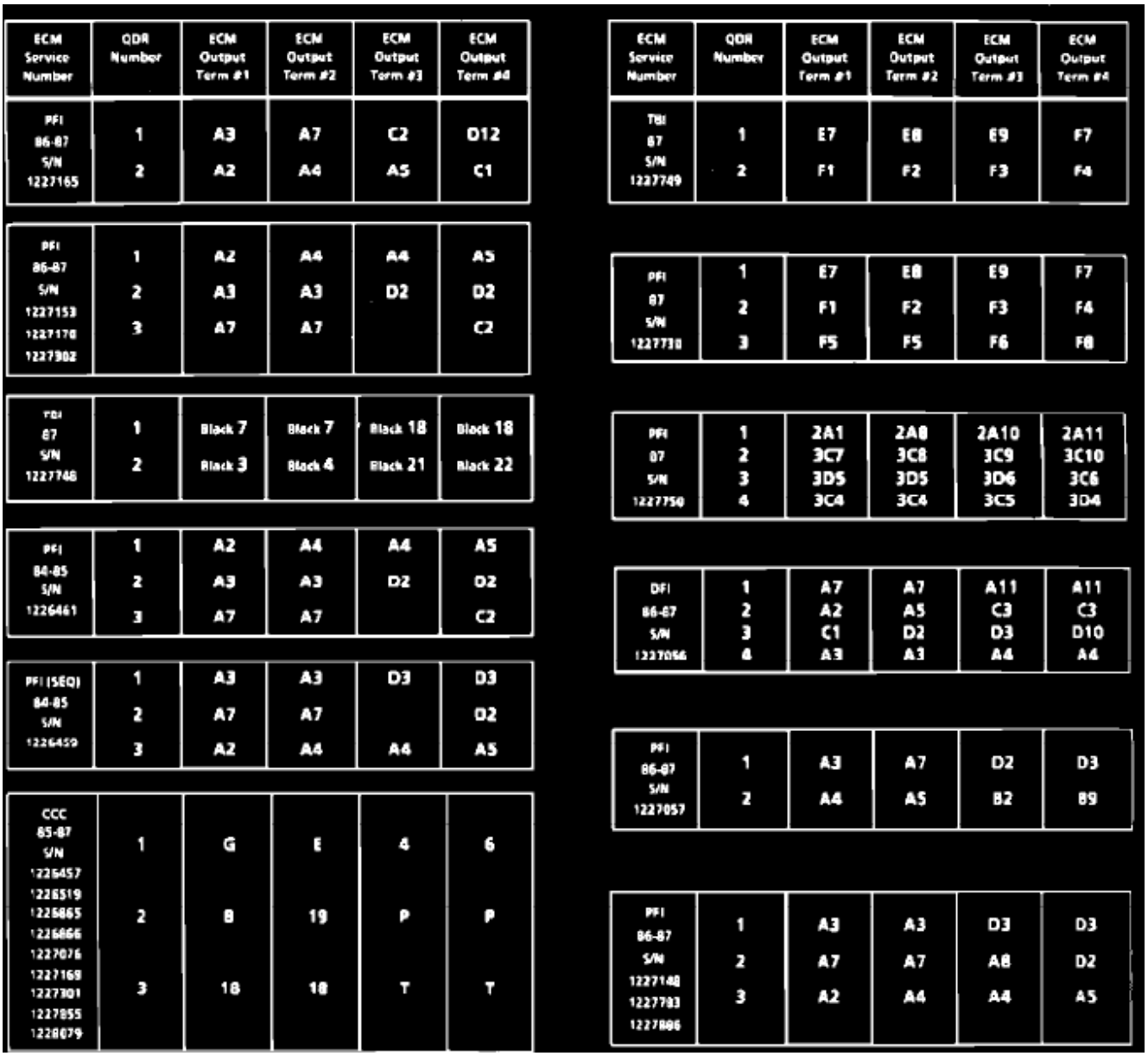
^ Not all available QDR outputs are used for ECM application. Verify circuit usage from the ECM wiring diagrams for each specific engine using Section "6E" of the service manual.

*Additional ECMs listed on page 4



ECM - CHECK CHART

ECM - CHECK CHART



ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
PFI 86-87 S/N 1227165	1	A3	A7	C2	D12
	2	A2	A4	A5	C1
PFI 86-87 S/N 1227153 1227170 1227902	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	A7	A7		C2
TBI 87 S/N 1227746	1	Black 7	Black 7	Black 18	Black 18
	2	Black 3	Black 4	Black 21	Black 22
PFI 84-85 S/N 1226461	1	A2	A4	A4	A5
	2	A3	A3	D2	D2
	3	A7	A7		C2
PFI (SEQ) 84-85 S/N 1226459	1	A3	A3	D3	D3
	2	A7	A7		D2
	3	A2	A4	A4	A5
CCC 85-87 S/N 1226457 1226519 1226865 1226866 1227076 1227169 1227301 1227855 1228079	1	G	E	4	6
	2	B	19	P	P
	3	18	18	T	T

ECM Service Number	QDR Number	ECM Output Term #1	ECM Output Term #2	ECM Output Term #3	ECM Output Term #4
TBI 87 S/N 1227749	1	E7	E8	E9	F7
	2	F1	F2	F3	F4
PFI 87 S/N 1227738	1	E7	E8	E9	F7
	2	F1	F2	F3	F4
	3	F5	F5	F6	F8
PFI 87 S/N 1227750	1	2A1	2A8	2A10	2A11
	2	3C7	3C8	3C9	3C10
	3	3D5	3D5	3D6	3C6
	4	3C4	3C4	3C5	3D4
DFI 86-87 S/N 1227066	1	A7	A7	A11	A11
	2	A2	A5	C3	C3
	3	C1	D2	D3	D10
	4	A3	A3	A4	A4
PFI 86-87 S/N 1227057	1	A3	A7	D2	D3
	2	A4	A5	B2	B9
PFI 86-87 S/N 1227148 1227783 1227806	1	A3	A3	D3	D3
	2	A7	A7	A8	D2
	3	A2	A4	A4	A5

QDR APPLICATION CHART

QDR Application Chart For CHART C-1

The following chart contains ECM QDR arrangement for all ECM models thru 1987. Important Note:

^ Many 82-83 ECMs did not use QDRs, and will not appear on the chart.

^ This procedure will not work on any ECM Service Number which does not appear on the chart. (This is because such an ECM does not contain QDRs.)

^ Not all available QDR outputs are used for ECM application. Verify circuit usage from the ECM wiring diagrams for each specific engine using Section "6E" of the service manual.

ECM TERMINAL VOLTAGE

THIS ECM VOLTAGE CHART IS FOR USE WITH DIGITAL VOLTMETER TO FURTHER AID IN DIAGNOSIS. THESE VOLTAGES WERE DERIVED FROM A KNOWN GOOD VEHICLE. THE VOLTAGES YOU GET MAY VARY DUE TO LOW BATTERY CHARGE OR OTHER REASONS, BUT THEY SHOULD BE VERY CLOSE.

THE FOLLOWING CONDITIONS MUST BE MET BEFORE TESTING:

- ENGINE AT OPERATING TEMPERATURE
- CLOSED LOOP (ENGINE AT 1000 RPM)
- ENGINE AT 1000 RPM (FOR "ENGINE RUN" COLUMN)
- TEST TERMINAL NOT GROUNDED
- SCANNER NOT INSTALLED
- 2 WD

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open			
0	0	0	SENSOR RETURN	22	1
5	5	5	5V REFERENCE	21	2
.5-.65	2-3	*.5	VACUUM SENSOR SIGNAL	20	3
12	14	*.5	EGR	19	4
12	5-10 (var.)	*.5	M/C SOLENOID	18	5
			NOT USED	17	6
			NOT USED	16	7
			NOT USED	15	8
*.5	*.5	1.7	OXYGEN SENSOR – LO	14	9
*.5	*.5	*1.0	DIST. REF. PULSE – LO	13	10
*.5	1-2 (var.)	*.5	EST	12	11

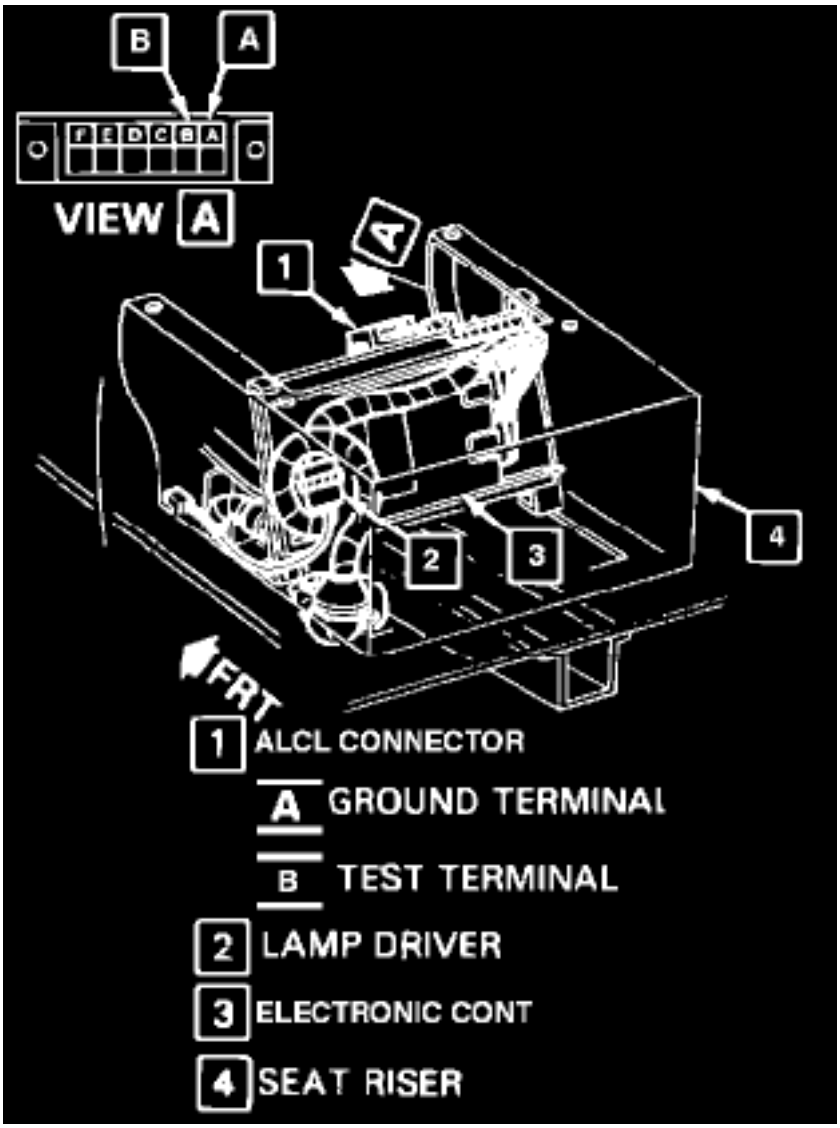
Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open	
			NOT USED
*1.0 +5.0	*2.0	5.0	TPS SENSOR SIGNAL
*3.0	*2.5	5.0	COOLANT TEMP. SENSOR SIGNAL
			NOT USED
5	5	5	DIAGNOSTIC TEST TERM
			NOT USED
0	0	0	COOLANT TEMP. SENSOR RETURN
			NOT USED
.3-.45	.1-.9 (var.)	.3-.45	OXYGEN SENSOR – HI
*.5	1-2 (var.)	*.5	DIST. REF. PULSE – HI
*.5	3.7	*.5	IGN. MODULE BY-PASS

			NOT USED	J	K
			NOT USED	H	L
10	*.5	*.5	"CHECK ENGINE" LAMP	G	M
			NOT USED	F	N
			NOT USED	E	P
			NOT USED	D	R
12	14	*.5	IGN. 1 POWER	C	S
12	.14	*.5	AIR DIVERT SOLENOID	B	T
0	0	0	GROUND (TO ENGINE)	A	U

			NOT USED
			NOT USED
			NOT USED
*.5	*.5	12	4TH GEAR SWITCH
12	14	*.5	TRANS CONVERTER CLUTCH SOLENOID
12	14	*.5	TROUBLE CODE MEMORY POWER
			NOT USED
12	.12	*.5	PURGE
0	0	0	GROUND (TO ENGINE)

* = Value Shown or Less Than that Value
† = Wide Open Throttle
(var.) = variable

ECM Terminal Identification & Voltage Specifications



Electronic Control Module

ECM TERMINAL VOLTAGE

THIS ECM VOLTAGE CHART IS FOR USE WITH DIGITAL VOLTMETER TO FURTHER AID IN DIAGNOSIS. THESE VOLTAGES WERE DERIVED FROM A KNOWN GOOD VEHICLE. THE VOLTAGES YOU GET MAY VARY DUE TO LOW BATTERY CHARGE OR OTHER REASONS, BUT THEY SHOULD BE VERY CLOSE.

THE FOLLOWING CONDITIONS MUST BE MET BEFORE TESTING:

- ENGINE AT OPERATING TEMPERATURE
- CLOSED LOOP (ENGINE AT 1000 RPM)
- ENGINE AT 1000 RPM (FOR "ENGINE RUN" COLUMN)
- TEST TERMINAL NOT GROUNDED
- SCANNER NOT INSTALLED
- 2 WD

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open			
0	0	0	SENSOR RETURN	22	1
5	5	5	5V REFERENCE	21	2
.5-.65	2-3	*.5	VACUUM SENSOR SIGNAL	20	3
12	14	*.5	EGR	19	4
12	5-10 (var.)	*.5	M/C SOLENOID	18	5
			NOT USED	17	6
			NOT USED	16	7
			NOT USED	15	8
*.5	*.5	1.7	OXYGEN SENSOR – LO	14	9
*.5	*.5	*1.0	DIST. REF. PULSE – LO	13	10
*.5	1-2 (var.)	*.5	EST	12	11

Voltage Key "ON"	Voltage Engine Run	Voltage Circuit Open	
NOT USED			
TPS SENSOR SIGNAL	*1.0 +5.0	*2.0	5.0
COOLANT TEMP. SENSOR SIGNAL	*3.0	*2.5	5.0
NOT USED			
DIAGNOSTIC TEST TERM	5	5	5
NOT USED			
COOLANT TEMP. SENSOR RETURN	0	0	0
NOT USED			
OXYGEN SENSOR – HI	.3-.45	.1-.9 (var.)	.3-.45
DIST. REF. PULSE – HI	*.5	1-2 (var.)	*.5
IGN. MODULE BY-PASS	*.5	3.7	*.5

			NOT USED	J	K
			NOT USED	H	L
10	*.5	*.5	"CHECK ENGINE" LAMP	G	M
			NOT USED	F	N
			NOT USED	E	P
			NOT USED	D	R
12	14	*.5	IGN. 1 POWER	C	S
12	.14	*.5	AIR DIVERT SOLENOID	B	T
0	0	0	GROUND (TO ENGINE)	A	U

NOT USED			
NOT USED			
NOT USED			
4TH GEAR SWITCH	*.5	*.5	12
TRANS CONVERTER CLUTCH SOLENOID	12	14	*.5
TROUBLE CODE MEMORY POWER	12	14	*.5
NOT USED			
PURGE	12	.12	*.5
GROUND (TO ENGINE)	0	0	0

* = Value Shown or Less Than that Value
† = Wide Open Throttle
(var.) = variable

ECM Terminal Identification & Voltage Specifications

Engine Control Module: Description and Operation "E" Cell

The ``E'' cell controls voltage at ECM terminal 15. For the first 25,000 miles of vehicle operation, voltage is nearly zero. The ``E'' cell then causes voltage to rise to approximately 5 volts. This provides a different control value for some systems.

Engine Control Module: Description and Operation Electronic Spark Timing (EST)

Electronic Spark Timing is used on all Calif. vehicles. The EST distributor contains no centrifugal or vacuum advance and uses a seven terminal High Energy Ignition (HEI) module. A four-terminal connector is used for EST use, in addition to the connectors normally found on HEI distributors. All spark timing changes are controlled by the ECM, which monitors information from the various engine sensors, computes the correct spark timing, then signals the distributor to adjust the timing accordingly. The distributor operates without ECM control during cranking or when setting basic ignition timing. This is known as the ``Bypass'' mode and it is determined by the bypass lead from the ECM to the distributor. When the bypass lead voltage is 5 volts, the ECM performs the spark timing function. However, when the bypass lead is grounded or open circuited, the HEI module assumes the spark control function. Disconnecting the four-terminal EST connector causes the engine to automatically operate in the bypass mode. The EST connector should be disconnected whenever setting basic ignition timing.

Engine Control Module: Description and Operation General System Description

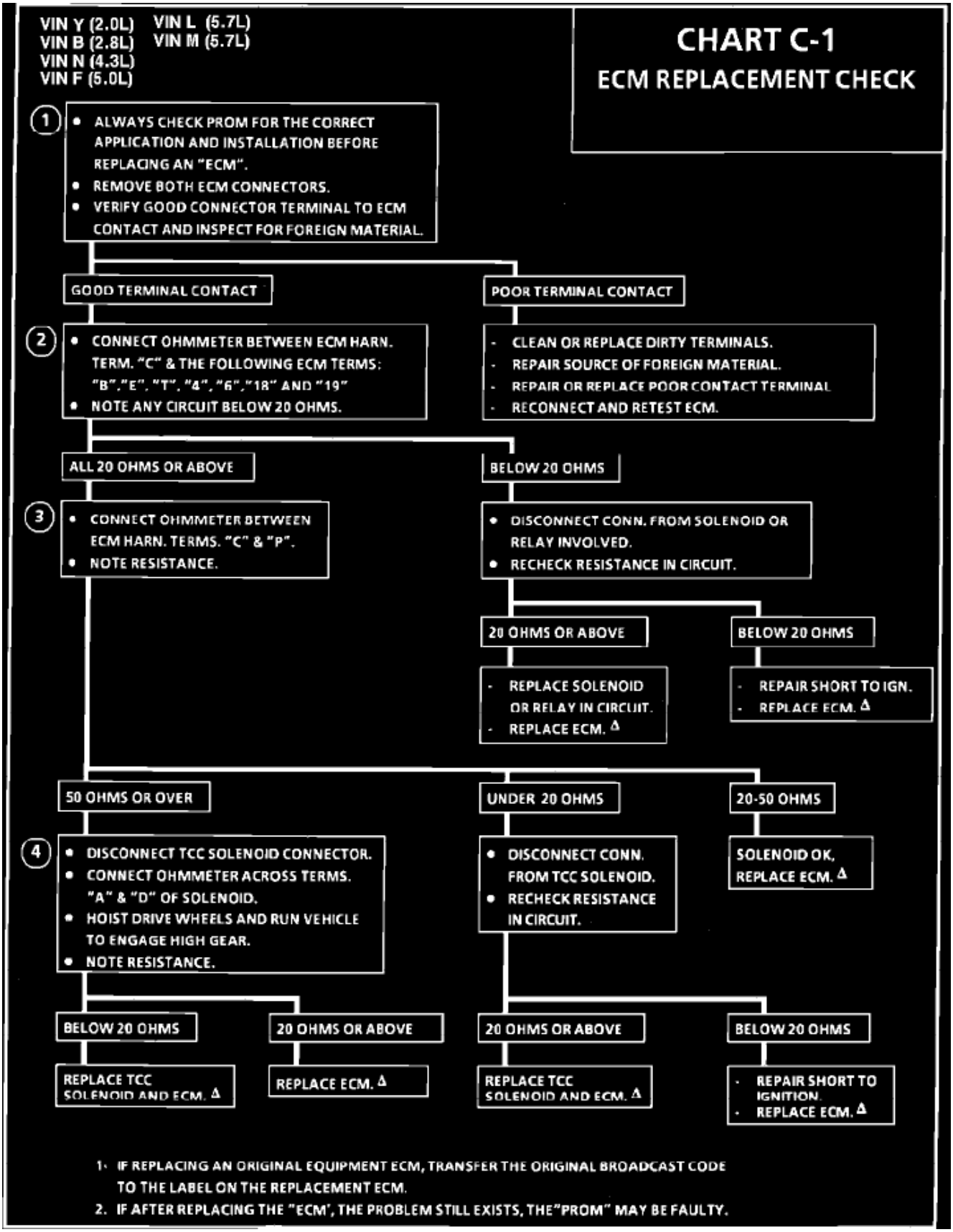
The ECM is the control center of the C3 system. Its function is to monitor input information from the various sensors, process this information, then generate output commands to the various systems that affect the performance of the vehicle. The ability of the ECM to perform these functions is dependent upon a removable calibration unit called the PROM. There are specific ECM/PROM combinations for each vehicle and they should not be interchanged. The ECM also performs the diagnostic function of the C3 system, alerting the driver through a ``Check Engine'' light should any problem in the system arise and storing a code or series of codes which the technician uses as an aid in making repairs.

Engine Control Module: Description and Operation Trouble Code Memory

The ECM is capable of sensing certain system malfunctions, storing data related to these malfunctions in the trouble code memory and alerting the operator of the malfunctions through the instrument panel mounted "Check Engine" lamp. If a system malfunction occurs while the engine is running, the ``Check Engine'' lamp will light and a trouble code will be stored in the ECM memory. The lamp will remain on with the engine running until malfunction is corrected. If the malfunction is intermittent, the lamp will go out but the code will remain stored in the trouble code memory.

Engine Control Module: Diagnostic Trouble Code Descriptions

For information regarding B, C, P, U and Manufacturer Code Descriptions -

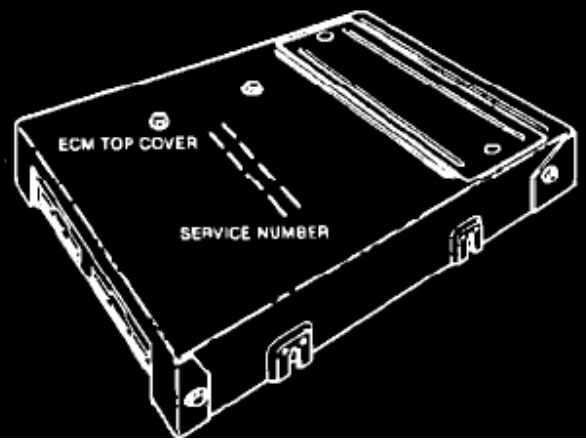


Engine Control Module: Component Tests and General Diagnostics

Chart C-1 - ECM Replacement Check

Remove or Disconnect (Figures 1 and 2)

1. New electronic control module out of its packaging and check the service number to make sure it is the same as the faulty ECM.
2. Access cover so that PROM from faulty ECM may be installed in replacement ECM.



Important

REPLACEMENT ELECTRONIC CONTROL MODULE (ECM) IS SUPPLIED WITHOUT AN ENGINE CALIBRATION UNIT (PROM) SO CARE SHOULD BE TAKEN WHEN REMOVING THE PROM FROM THE DEFECTIVE ECM AS IT WILL BE REUSED IN THE NEW ECM. REFER TO PROM REPLACEMENT PROCEDURE AS DETAILED IN CODE 51.

ECM Replacement Check for Chart C-1

CHART C-1 - ECM REPLACEMENT CHECK

Circuit Description: Prior to replacing an ECM, the circuit involved must be tested for:

^ Poor connector terminal to ECM contact;

^ Direct battery voltage on an ECM ground circuit from a short to B+; or

^ Shorted solenoid or relay. If a short is found, the circuit must be repaired prior to replacing the ECM to prevent repeat ECM failures

Test Description:

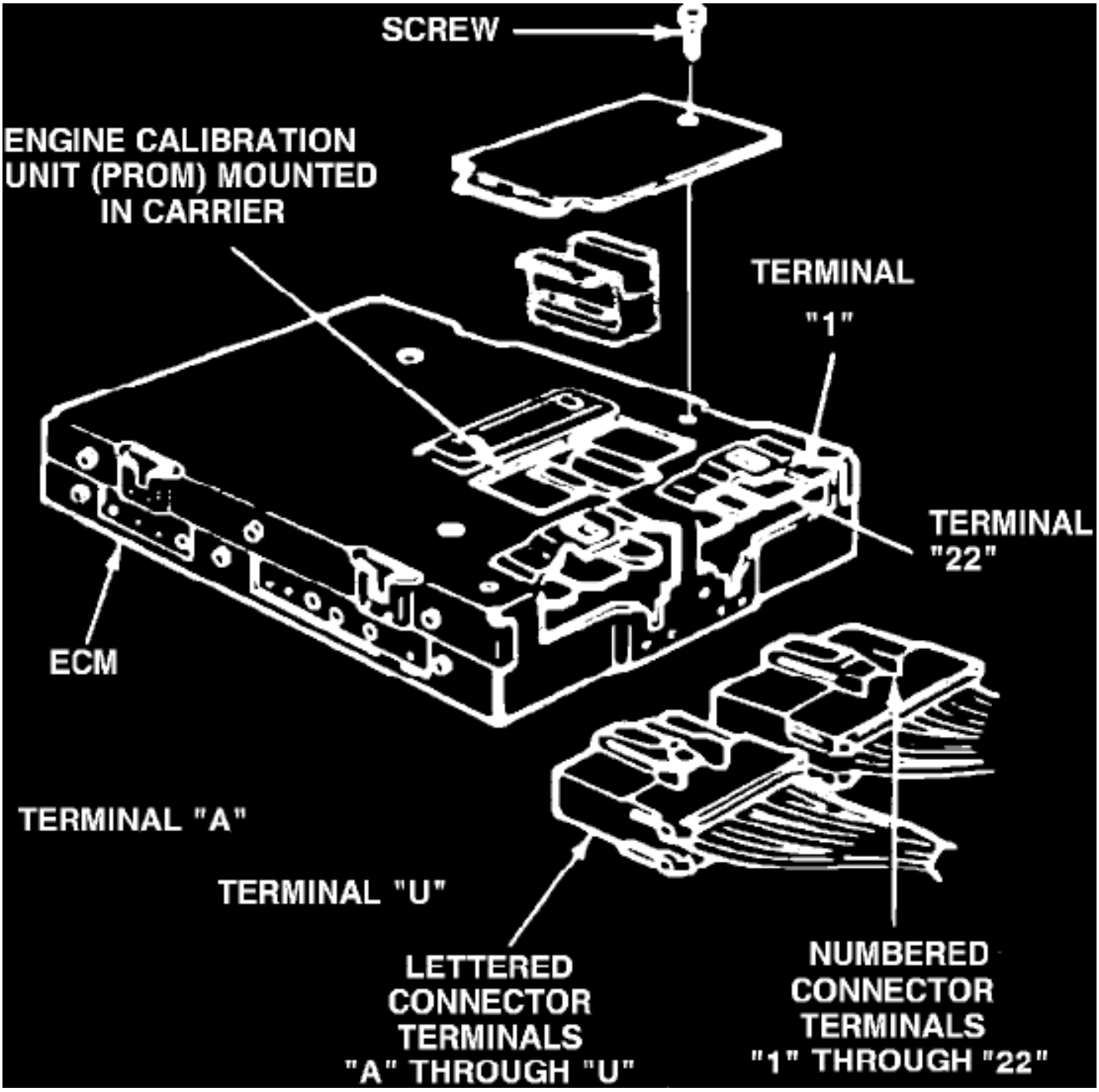
1. Check for good terminal contact due to weak or dirty terminals. Remove terminal to inspect. Replace if broken or dirty. If coolant is present, replace coolant sensor and connector. Also, replace ECM connector terminal and blow coolant out of harness. Clean connector with alcohol or spray contact cleaner and replace ECM.

2. Check for a short to ignition or shorted solenoid or relay. All terminals must be tested since several are connected internally in the ECM. A short in one circuit may cause another circuit in the ECM to be inoperative that does not have an external fault, but was the cause of "driver's complaint." Any circuit testing below 20 ohms is shorted to ignition, or shorted across the relay or solenoid.

3. Check for shorted TCC solenoid. Some transmissions have a normally open 4th gear switch in series with the solenoid. The ohmmeter will read infinite resistance (open circuit) in these cases. If the reading is less than 20 ohms, a short to ignition or faulty solenoid exists. A normal solenoid will

read between 20 - 50 ohms.

4. Check for shorted TCC circuit in units with a 4th gear switch. The vehicle must be in 4th gear to close the switch to obtain a resistance reading. A normal solenoid will read between 20-50 ohms.



Engine Control Module: Service and Repair

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB #88-42, DATED 09/87

Some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB #88-283-6E, DATED 7/88

To prevent possible electrostatic discharge damage to electrical components:

-Do not touch the ECM connector pins or soldered components on the circuit board. -When handling a PROM, CAL-PAK or MEM-CAL, do not touch the component leads and do not remove integrated circuit from carrier.

Fig. 249 Electronic Control Module (ECM)

1. Disconnect battery ground cable.

2. Disconnect numbered and lettered connectors from ECM, Fig. 249.

3. Remove ECM mounting hardware, then the ECM from the passenger compartment.

4. Reverse procedure to install. Replacement Electronic Control Modules are not equipped with engine calibration units (PROM). If PROM is to be reused, care should be taken when removing it from defective ECM. See ``Prom, Replace'' for proper removal procedure.

Engine	Year	Resistance (ohms)
All TBI	1981-90	20 min.

Idle Speed Control Motor: Electrical Specifications

IDLE SPEED CONTROL

Measured between terminals A& B and C & D.

Idle Speed Control Motor: Mechanical Specifications

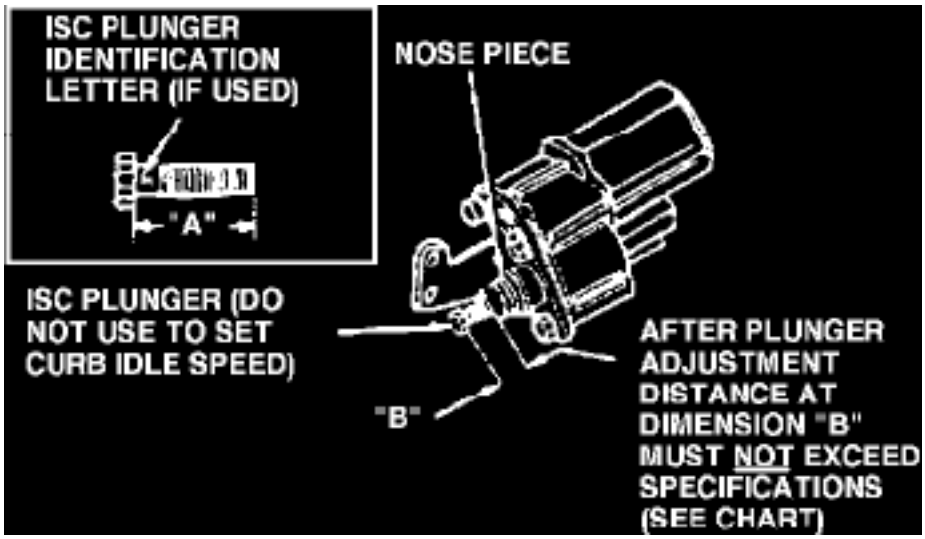
ISC PLUNGER ADJUSTMENT CHART

Identification Letter	Plunger Length Dimension "A"	Plunger Length Dimension "B"
None	14.1 mm (9/16")	5.6 mm (7/32")
None	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/6'4")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1LL)	17.1 mm (43/64")
L	27.5 mm (1 -3/32")	19.0 mm (3/4")
J	30.0 mm (1-3/16")	21.5 mm (27/32")
N	32.0 mm (1-17/64")	23.5 mm (59/64")
T	34.0 mm (1-11/32")	25.5 mm (1")

Idle Speed Control Motor: Description and Operation

The ISC assembly controls engine idle speed according to ECM programming.

When the throttle lever rests against the ISC plunger, the ISC acts as a dashpot on throttle closing per second.



Idle Speed Control Motor: Adjustments

On engines equipped with an idle speed control motor, idle speed is controlled by an electrical signal from the ECM. Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows. See Underhood Emission Label.

Plunger - Maximum Adjustment

NOTE: Prior to adjustment, check for an identification letter on the ISC plunger. If NO LETTER appears, using Tool J-29607, BT-8022 or equivalent,

remove plunger from ISC Unit. Then, measure length of plunger from back side of plunger head to end of plunger screw - Dimension "A". Record this measurement for use at Step 17. Reinstall plunger in ISC unit, turning plunger into a preset position so that the distance measured from the back side of the plunger head to the ISC nosepiece is LESS THAN Dimension "B".

ISC PLUNGER ADJUSTMENT CHART

Identification Plunger Length Plunger Length

Letter Dimension "A" Dimension "B"

None 14.1 mm (9/16") 5.6 mm (7/32")

None 16.3 mm (41/64") 8.0 mm (5/16")

X 18.5 mm (47/64") 10.0 mm (25/6'4")

A 19.3 mm (49/64") 10.8 mm (27/64")

Y 20.5 mm (51/64") 12.0 mm (15/32")

S 21.2 mm (27/32") 12.7 mm (1/2")

Z 22.5 mm (7/8") 14.0 mm (35/64")

G 23.2 mm (29/32") 14.7 mm (37/64")

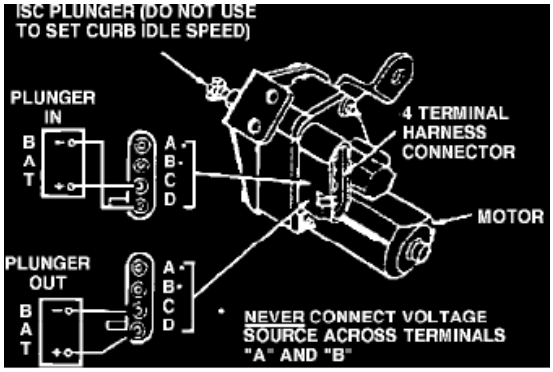
E 25.6 mm (1LL) 17.1 mm (43/64")

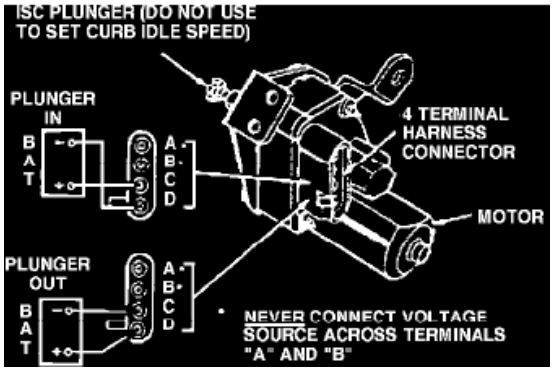
L 27.5 mm (1 -3/32") 19.0 mm (3/4")

J 30.0 mm (1-3/16") 21.5 mm (27/32")

N 32.0 mm (1-17/64") 23.5 mm (59/64")

T 34.0 mm (1-11/32") 25.5 mm (1")





Idle Speed Control Assembly - Typical

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures - see emission label for latest instructions.

2. Before starting engine, place transmission in PARK (AUTO trans.) or NEUTRAL (MANUAL transmission), set parking brake, and block drive wheels.

3. Connect dwell meter to mixture control (M/C) solenoid dwell lead. Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF".

5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary).

6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

7. Unplug connector from ISC motor.

8. Fully retract ISC plunger by applying 12 volts to terminal "C" and grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

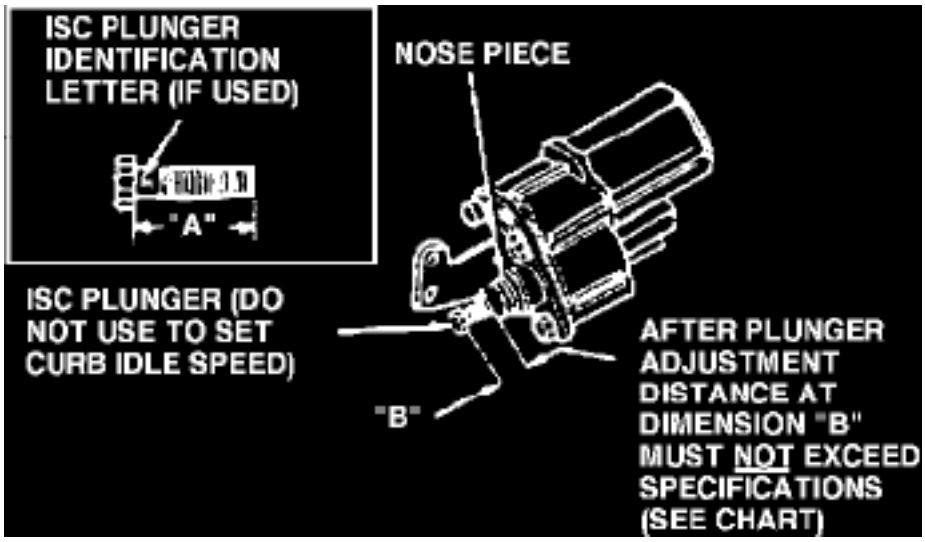
9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place A.T. transmission in Drive.

11. With ISC plunger fully retracted, adjust carburetor base (slow) idle stop screw (minimum authority) to the RPM shown in the carburetor charts.

12. PLACE TRANSMISSION IN PARK (AUTO TRANS.) OR NEUTRAL (MANUAL TRANS.).

Idle Speed Control Assembly - Typical



13. Fully extend ISC Plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC Motor Connection. Leave power

applied only long enough to extend the plunger.

14. Manual transmission: Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown

in carburetor charts.

15. Automatic Transmission:

a. With transmission in PARK, using Tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

b. With parking brake set and drive wheels blocked, place transmission in drive. Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown in carburetor charts.

Plunger - Maximum Adjustment

16. Recheck ISC "Maximum Authority" RPM with voltage applied to Motor (Step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nose piece, Dimension "B". Dimension must NOT exceed

that shown by plunger type as either identified by plunger length or letter identification.

18. Fully retract ISC Plunger (Step 8). Place transmission in PARK (AUTO Trans.) or NEUTRAL (MANUAL Transmission) and turn ignition "Off".

Disconnect 12 Volt Power source, Ground lead, Tachometer and Dwell Meter. With ignition "Off" reconnect four Terminal Harness connectors to ISC Motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By restoring

the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-90	Barometric, Manifold Absolute	3.8-5.5 @ 0-1000 3.6-5.3 @ 1000-200 3.5-5.1 @ 2000-300 3.3-5.0 @ 3000-400 3.2-4.8 @ 4000-500 3.0-4.6 @ 5000-600 2.9-4.5 @ 6000-700 2.5-4.3 @ 7000-

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-88	Vacuum	.50-.64 @ ign. on 1.7-3.0*

* 10 in./250 mm applied to unit.

Absolute Pressure Sensor: Specifications

MANIFOLD ABSOLUTE, VACUUM AND BAROMETRIC PRESSURE SENSORS

Engines may use one, or a combination of these sensors. All sensors appear the same. Manifold Absolute Pressure sensors have a vacuum line connected between the unit and manifold vacuum. On Barometric Pressure sensors, the line is not used and the connector is either open or has a filter installed over it. Pressure sensors also have a vacuum line between the sensor and intake manifold and only appear on carburetted models.

Barometric Pressure Sensors: Measure voltage with ignition on and engine off.

Manifold Absolute Pressure Sensors: Measure voltage with ignition on and engine off. Start engine and apply 10 in./ 250 mm Hg to unit, voltage should be 1.2-2.3 volts less.

Pressure Sensors: Measure voltage as indicated.

Absolute Pressure Sensor: Description and Operation

The barometric pressure sensor senses changes in barometric pressure and provides this information, through an electrical signal, to the ECM. The sensor produces a voltage signal of 3.5 - 4 volts to indicate barometric pressure. The voltage increases in proportion to increases in altitude (decreases in barometric pressure). This sensor is normally used with the MAP sensor.

Absolute Pressure Sensor: Service and Repair

The MAP and Vacuum sensors are accessible through the engine compartment. The BARO sensor may be located either in the engine compartment or strapped to the ECM harness under the dash panel.

Other than checking for loose hoses and electrical connections, the only service required of these sensors is replacement should diagnosis show any sensors to be faulty.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

Coolant Temperature Sensor/Switch (For Computer): Description and Operation

The coolant temperature sensor supplies coolant temperature information to the ECM. It is mounted in the engine coolant stream and has high resistance when the engine is cold and low resistance when the engine is warm. The ECM receives this information and controls the various systems that are dependent on temperature for proper operation.

Coolant Temperature Sensor/Switch (For Computer): Service and Repair

1. Disconnect electrical connector and remove sensor.
2. Reverse procedure to install. Torque sensor to 72 in lbs.

Engine Speed Signal: Description and Operation

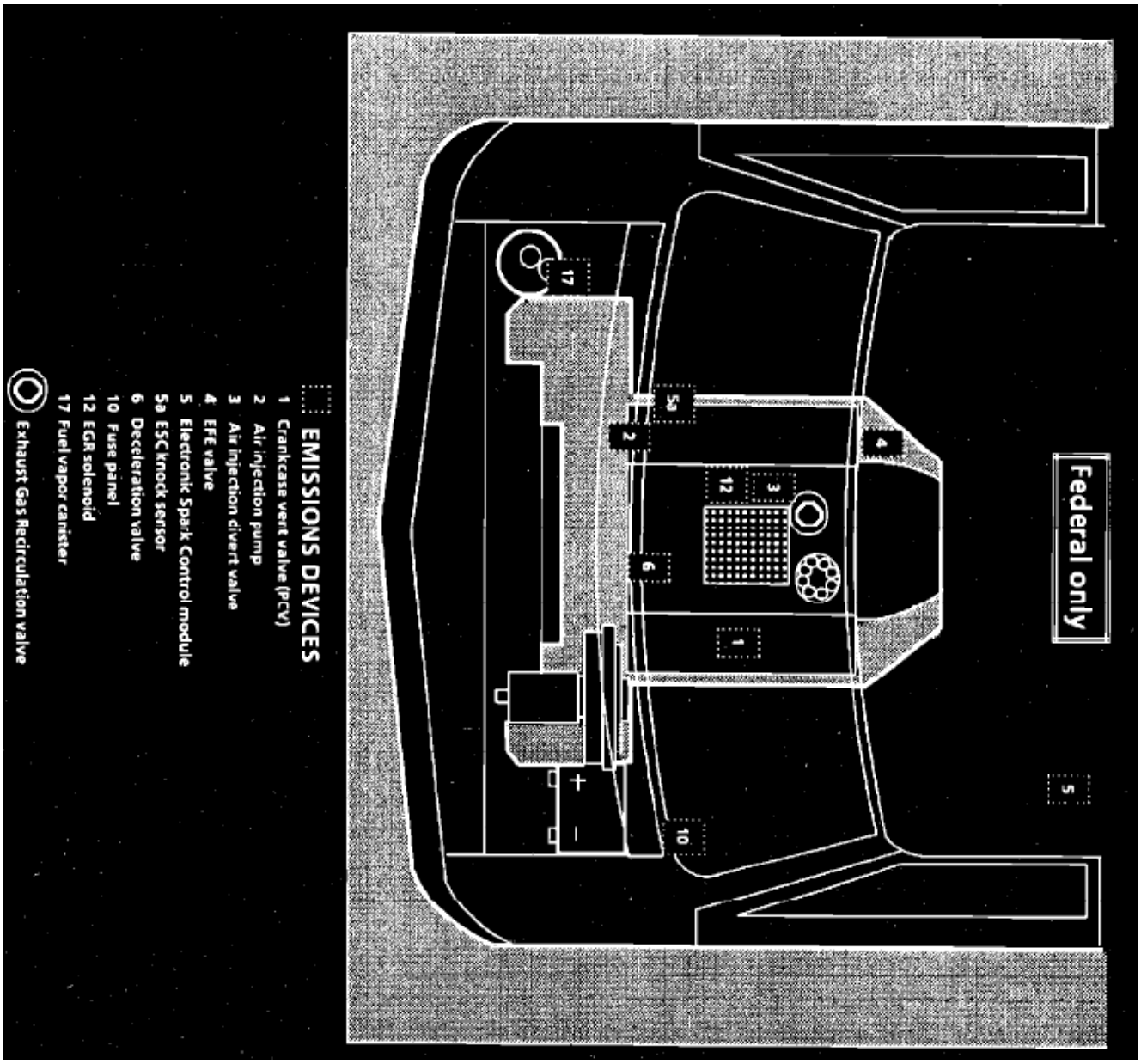
On all models with full function systems except V6-229 (1983 - 84 VIN code 9) engines, the ``R'' terminal on the 7 terminal ignition module provides reference pulses to the ECM indicating engine RPM and crankshaft position.

Engine	Year	Sensor	Resistance Ohms @ deg. F/C
All	1981-90	Coolant, Manifold Air*	13,500 @ 20/–7 7500 @ 40/4 3400 @ 70/20 1800 @ 100/38 450 @ 160/70 185 @ 210/100

* As equipped, not used on all engines.

TEMPERATURE SENSORS

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Computers and Control Systems > Sensors and Switches - Computers and Control Systems > Knock Sensor > Component Information > Locations > Electronic Spark Control Knock Sensor

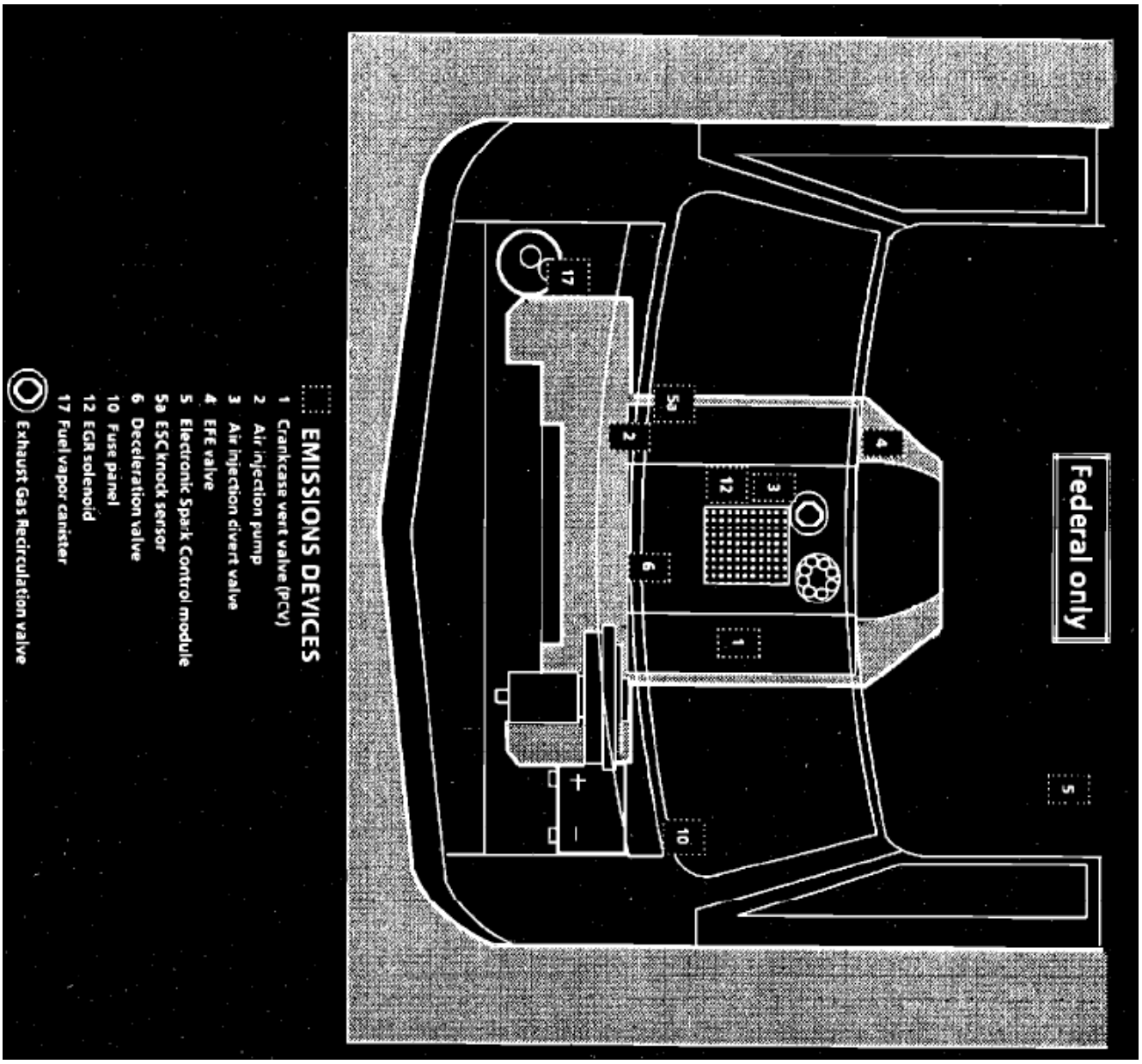


Knock Sensor: Locations Electronic Spark Control Knock Sensor

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Knock Sensor: Locations Electronic Spark Control Module

Underhood & Engine Components.

Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

Manifold Pressure/Vacuum Sensor: Technical Service Bulletins MAP - Revised Check Chart for DTC's 33, 34, 63, 64

Number: 90-199-6E

Section: 6E

Date: March 1990

Corporate Bulletin No.: 016510

Subject: REVISED CHART C-1D, CODE 33, 34, 63, 64

Model and Year: 1980-90 PASSENGER CARS AND TRUCKS

TO: ALL CHEVROLET DEALERS

This bulletin revises the Manifold Absolute Pressure (MAP) Output Check Chart C-1D and updates Code 33, Code 34, Code 63, and Code 64 in the Service Manual section on "Driveability And Emissions" (Section 6E1, 6E2, and 6E3). This information applies to all MAP Sensors on 1980-1990 vehicles with gasoline engines (except turbocharged) with green (standard) MAP sensor electrical connector insert or the solid black MAP sensor electrical connector insert.

The revised chart information:

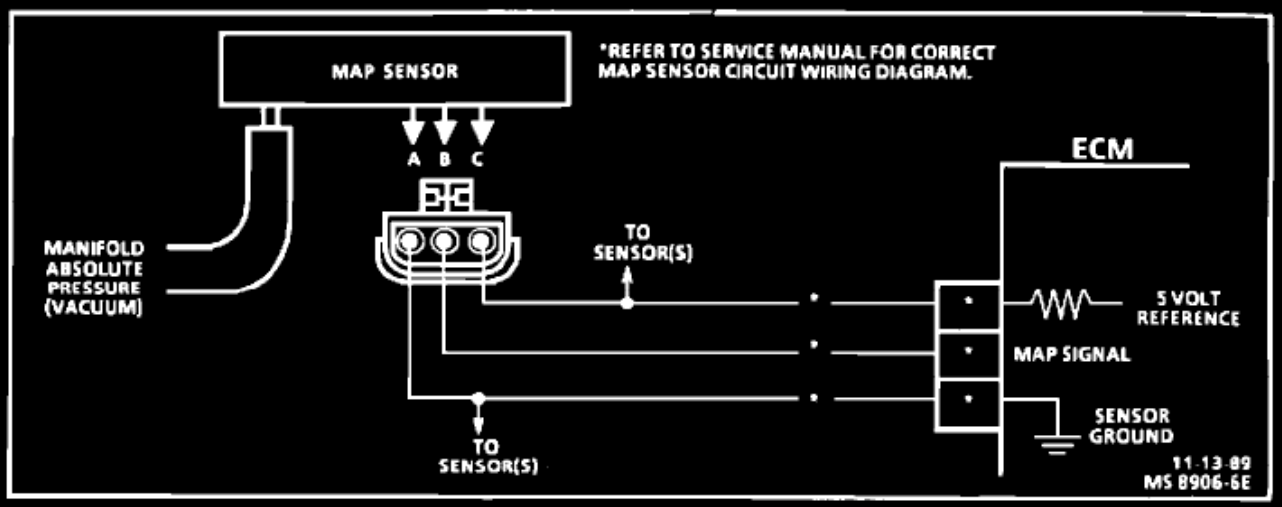


CHART C-1D

MANIFOLD ABSOLUTE PRESSURE (MAP) VOLTAGE OUTPUT CHECK

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor measures the changes in the intake manifold pressure which result from engine load (intake manifold vacuum) and rpm changes; and converts these into a voltage output. The ECM sends a 5 volt reference voltage to the MAP sensor. As the manifold pressure changed, the output voltage of the sensor also changes. By monitoring the sensor output voltage, the ECM knows the manifold pressure. A lower pressure (low voltage) output voltage will be about 1 - 2 volts at idle. While higher pressure (high voltage) output voltage will be about 4 - 4.8 at Wide Open Throttle (WOT). The MAP sensor is also used, under certain conditions, to measure barometric pressure, allowing the ECM to make adjustments for different altitudes. The ECM uses the MAP sensor to control fuel delivery and ignition timing.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

Important

- Be sure to use the same Diagnostic Test Equipment for all measurements.

1. When comparing "Scan" readings to a known good vehicle, it is important to compare vehicles that use a MAP sensor having the same color insert or having the same "Hot Stamped" number. See figures on facing page.
2. Applying 34 kPa (10" Hg) vacuum to the MAP sensor should cause the voltage to change. Subtract second reading from the first. Voltage value should be greater than 1.5 volts. Upon applying vacuum to the sensor, the change in voltage should be instantaneous. A slow voltage change indicates a faulty sensor.
3. Check vacuum hose to sensor for leaking or restriction. Be sure that no other vacuum devices are connected to the MAP hose.

NOTE: Make sure electrical connector remains securely fastened.

4. Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connection. Output changes greater than 1 volt indicate a bad connector or connection. If OK, replace sensor.

CHART C-1D

MANIFOLD ABSOLUTE PRESSURE (MAP) VOLTAGE OUTPUT CHECK

NOTE: THIS CHART ONLY APPLIES TO MAP SENSORS HAVING GREEN OR BLACK COLOR KEY INSERT (SEE BELOW).

1. • IGNITION "ON," ENGINE "OFF."
   • "SCAN" TOOL SHOULD INDICATE A MAP SENSOR VOLTAGE.
   • COMPARE THIS READING WITH THE READING OF A KNOWN GOOD VEHICLE. SEE FACING PAGE TEST DESCRIPTION, STEP 1.
   • VOLTAGE READING SHOULD BE WITHIN, ± .4 VOLT.
   IS IT?

YES

2. • DISCONNECT AND PLUG VACUUM SOURCE TO MAP SENSOR.
   • CONNECT A HAND VACUUM PUMP TO MAP SENSOR.
   • START ENGINE.
   • NOTE MAP SENSOR VOLTAGE.
   • APPLY 34 kPa (10" Hg) OF VACUUM AND NOTE VOLTAGE CHANGE. SUBTRACT SECOND READING FROM THE FIRST. VOLTAGE VALUE SHOULD BE GREATER THAN 1.5 VOLTS.
   IS IT?

YES

3. NO TROUBLE FOUND. CHECK SENSOR VACUUM SOURCE FOR LEAKAGE OR RESTRICTION. BE SURE THIS SOURCE SUPPLIES VACUUM TO MAP SENSOR ONLY.

NO

REPLACE SENSOR.

NO

4. CHECK SENSOR CONNECTION. IF OK, REPLACE SENSOR.

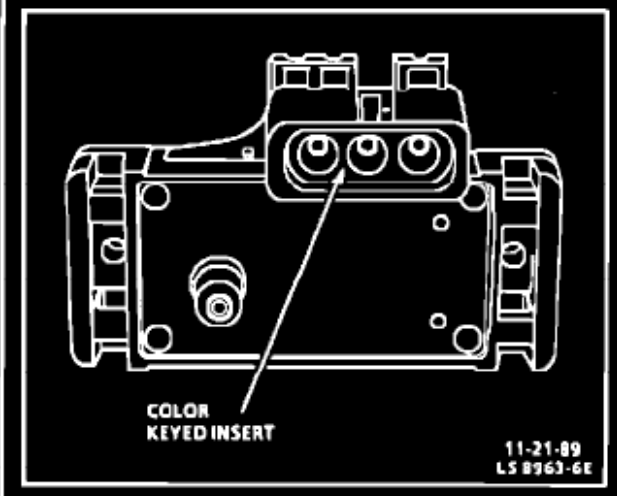


Figure 1 - Color Key Insert

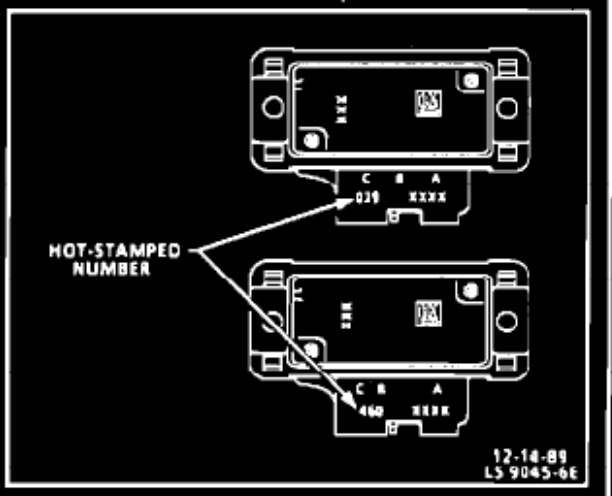


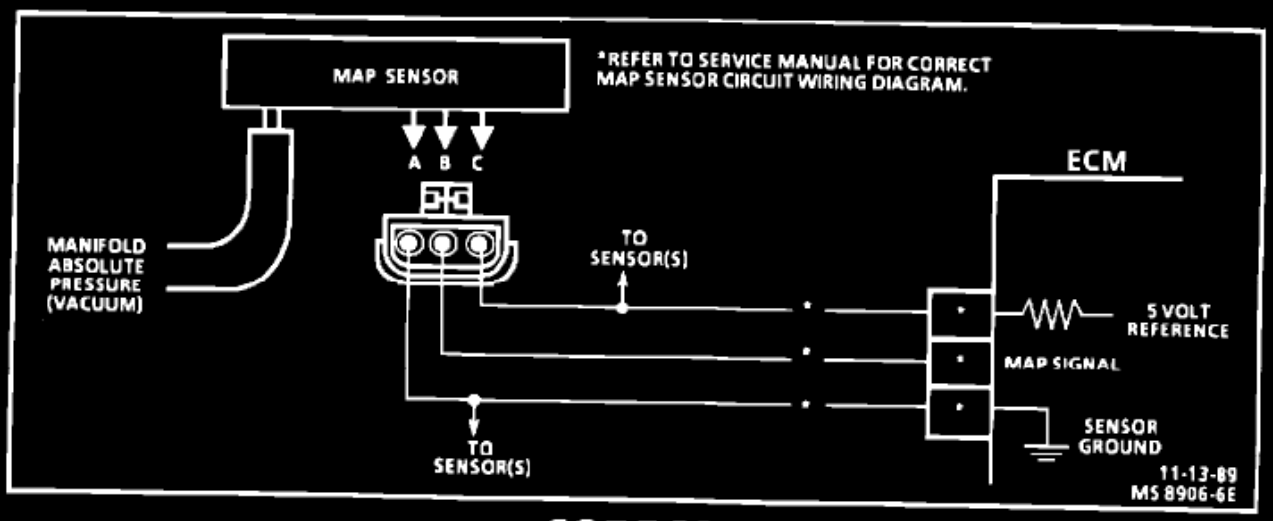
Figure 2 - Hot-Stamped Number

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "SERVICE ENGINE SOON" LIGHT.

2-28-90
• 753162-6E

- Diagnostic Chart C-1D.

The updated chart information:



CODE 33

MANIFOLD ABSOLUTE PRESSURE (MAP) OUTPUT CHECK
(SIGNAL VOLTAGE HIGH - LOW VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. This step will determine if Code 33 is the result of a hard failure or an intermittent condition.
   A Code 33 will set under the following conditions:
   - MAP signal voltage is too high (low vacuum).
   - TPS less than 2%.
   - These conditions exist longer than 5 seconds.
2. This step simulates conditions for a Code 34. If the ECM recognizes the change, the ECM and CKT 416 and CKT 432 are OK. If CKT 469 is open, there may also be a stored Code 23.

Diagnostic Aids:

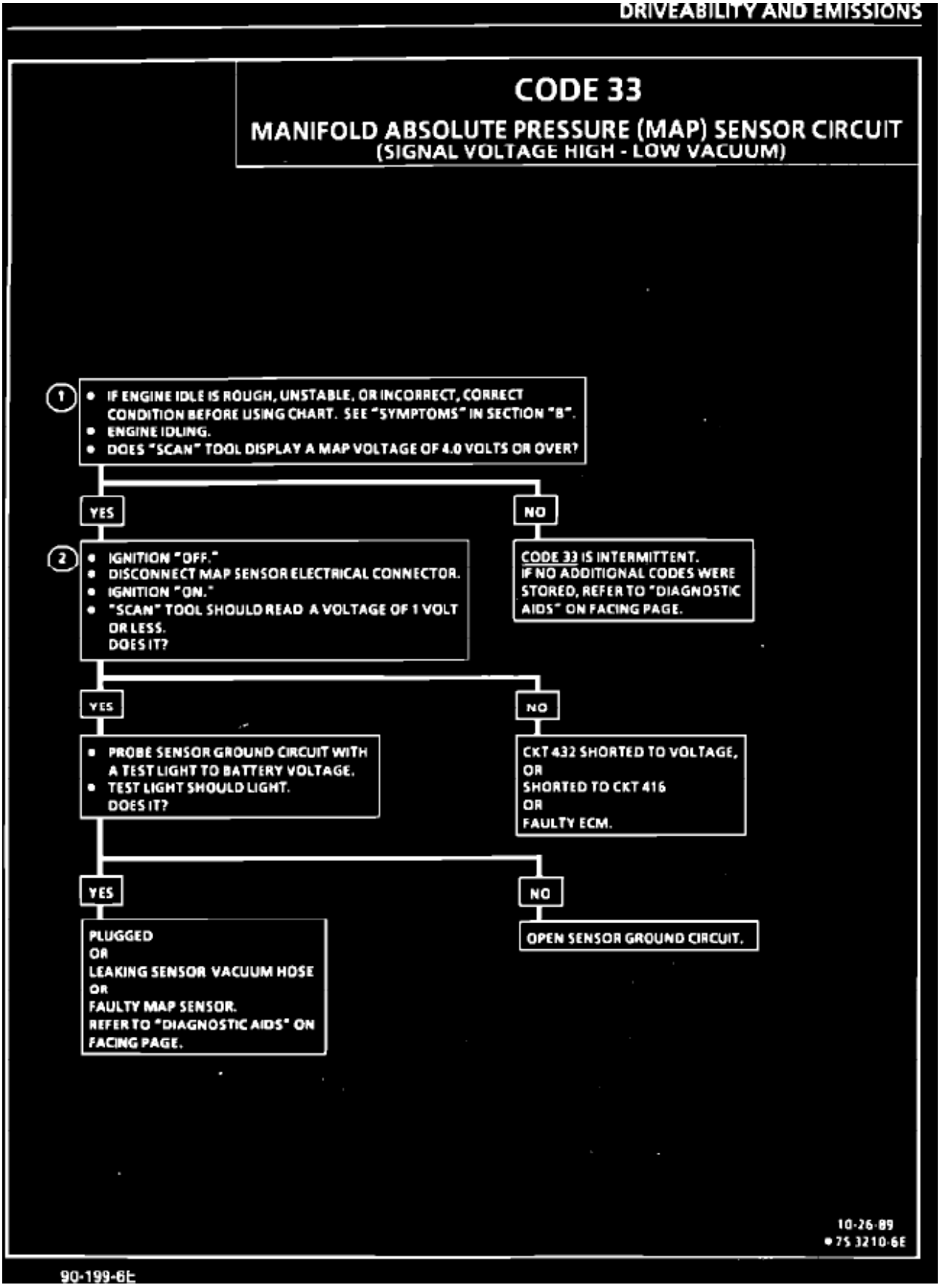
With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volt.

A Code 33 will result if CKT 469 is open or if CKT 432 is shorted to voltage or to CKT 416.

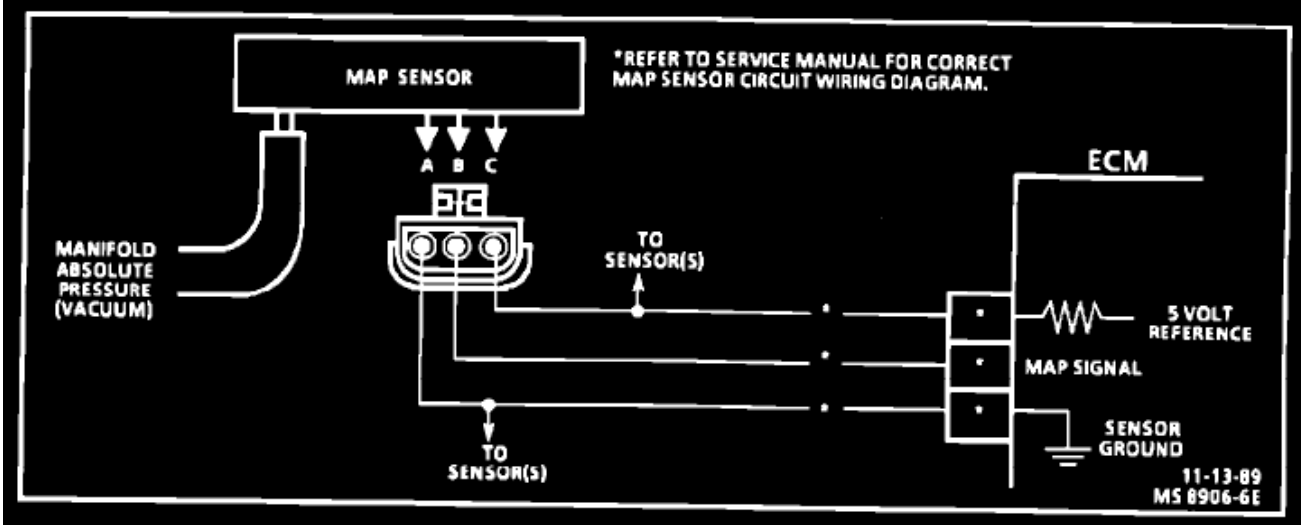
If Code 33 is intermittent, refer to Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.



- Diagnostic Chart Code 33.



CODE 34

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. This step determines if Code 34 is the result of a hard failure or an intermittent condition. A Code 34 will set when MAP signal voltage is too low and the ignition is "ON."
2. Jumpering harness terminals "B" to "C" (5 volts to signal circuit) will determine if the sensor is at fault, or if there is a problem with the ECM or wiring.
3. The "Scan" tool may not display 5 volts. The important thing is that the ECM recognizes the voltage as more than 4 volts, indicating that the ECM and CKT 432 are OK.

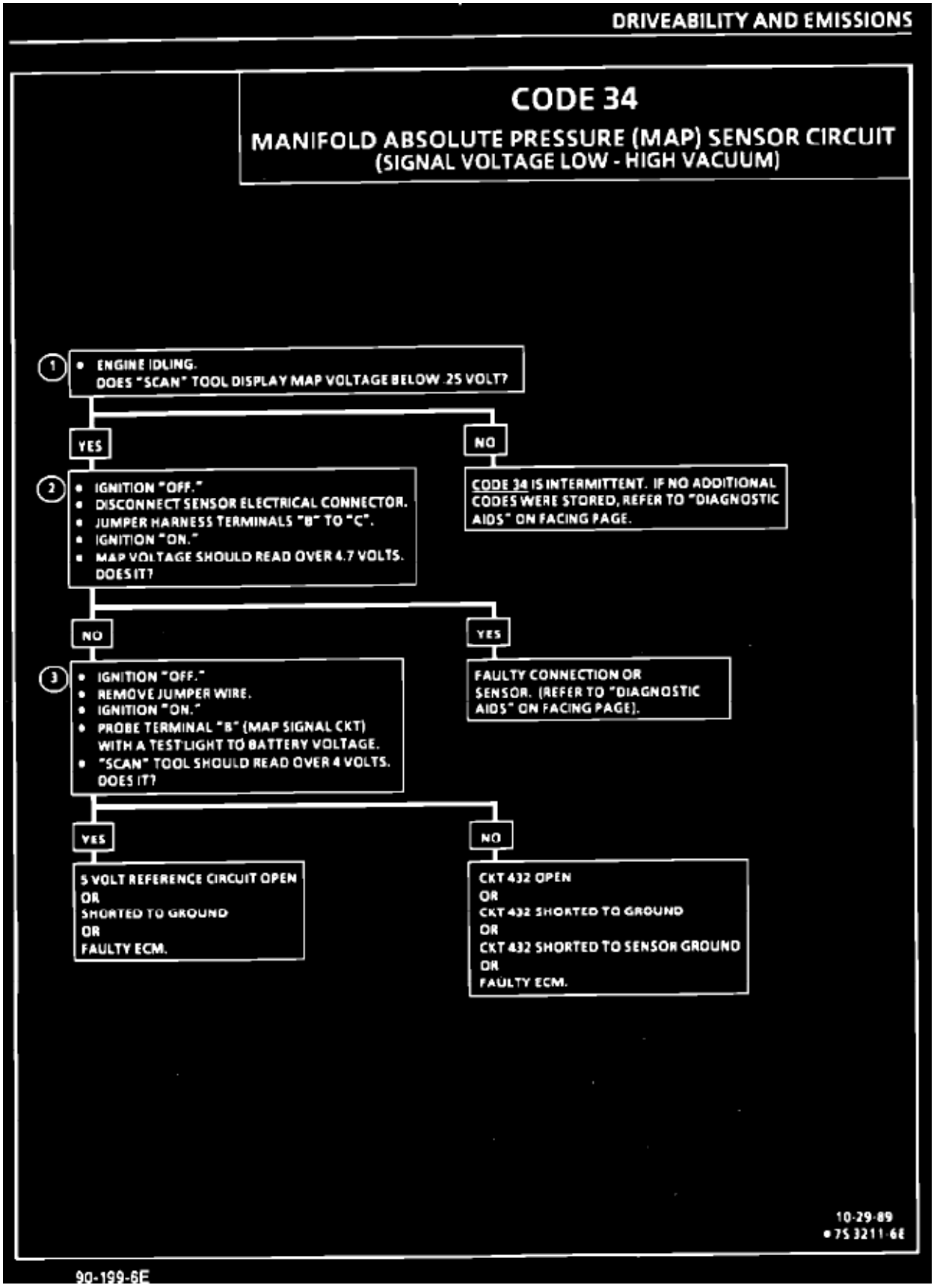
Diagnostic Aids:

An intermittent open in CKT 432 or CKT 416 will result in a Code 34. With the ignition "ON" and the engine "OFF," the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude.

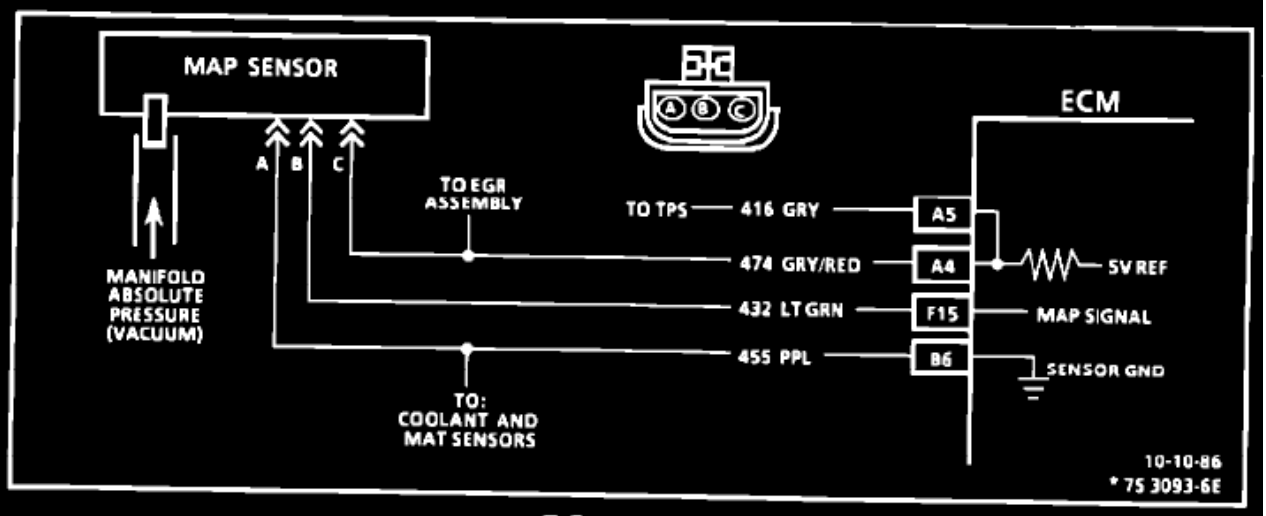
Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volts. Also CHART C-1D can be used to test the MAP sensor. Refer to "Intermittents" in Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor By hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.



- Diagnostic Chart Code 34.



CODE 63

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE HIGH - LOW VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 63 will set when:
   - Engine running.
   - Manifold pressure greater than 75.3 kPa (A/C "OFF") 81.2 kPa (A/C "ON").
   - Throttle angle less than 2%.
   - Conditions met for 2 seconds.

   Engine misfire or a low unstable idle may set Code 63.
2. With the MAP sensor disconnected, the ECM should see a low voltage if the ECM and wiring are OK.

Diagnostic Aids:

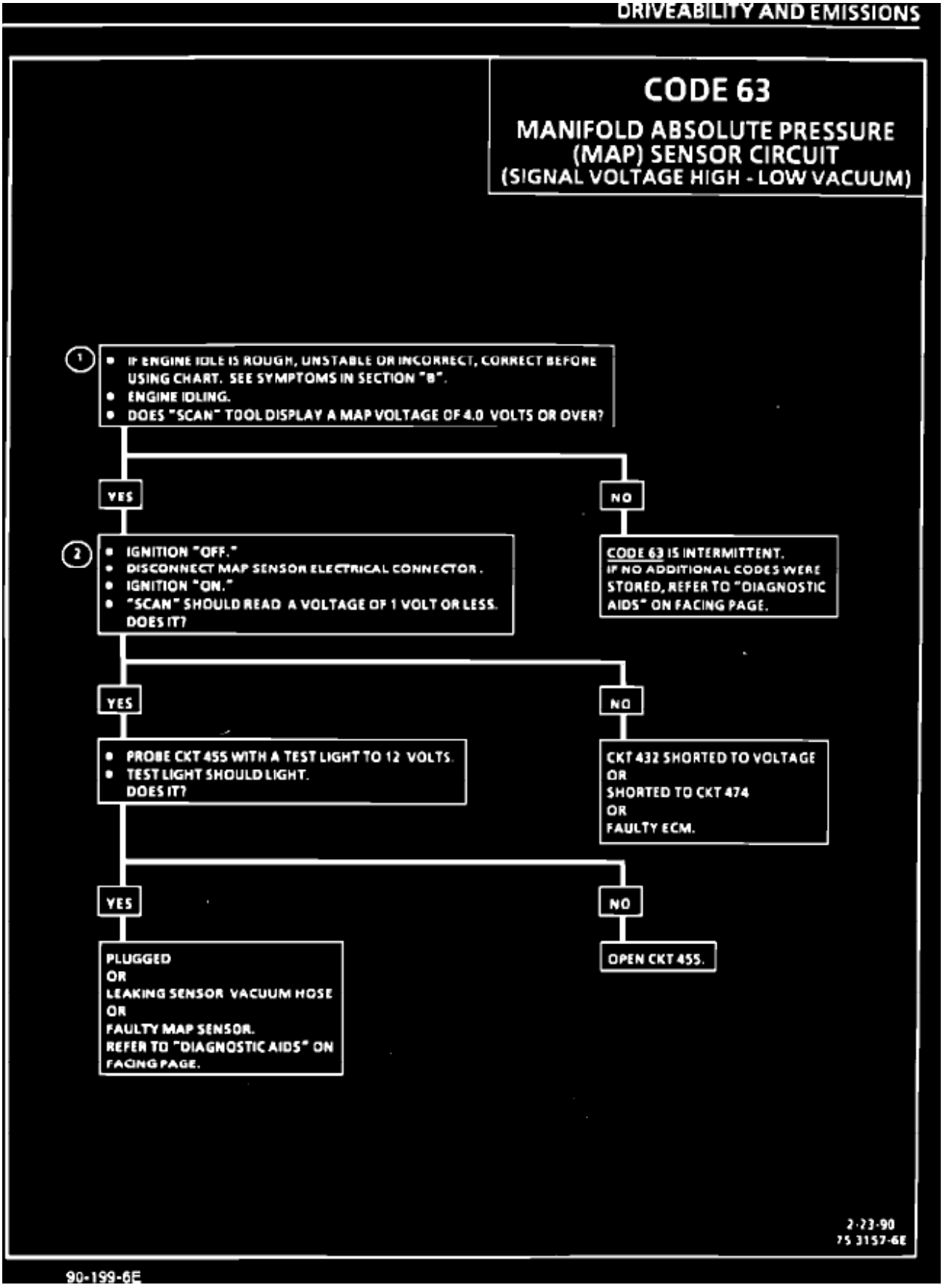
With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volt.

If idle is rough or unstable, refer to symptoms in Section "B" for items which can cause an unstable idle.

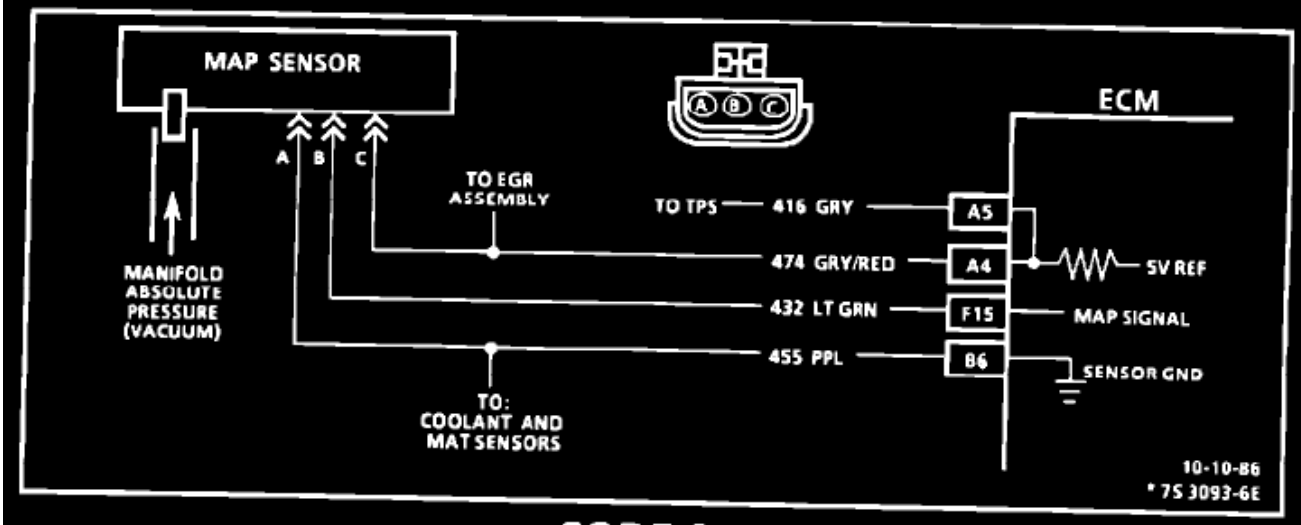
An open in CKT 455 or the connection will result in a Code 63.

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor by hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.



- Diagnostic Chart Code 63.



CODE 64

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM)

Circuit Description:

The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1 to 1.5 volts at closed throttle (idle) to 4.5 - 4.8 volts at wide open throttle (low vacuum).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 64 will set if:
   - Engine rpm less than 600.
   - Manifold pressure reading less than 13 kPa.
   - Conditions met for 1 second.

   or
   - Engine rpm greater than 600.
   - Throttle angle over 20%.
   - Manifold pressure less than 13 kPa.
   - Conditions met for 1 second.
2. This test to see if the sensor is at fault for the low voltage, or if there is an ECM or wiring problem.
3. This simulates a high signal voltage to check for an open in CKT 432. If the test light is bright during this test, CKT 432 is probably shorted to ground. If "Scan" reads over 4 volts at this test, CKT 474 can be checked by measuring the voltage at terminal "C" (should be 5 volts).

Diagnostic Aids:

An intermittent open in CKTs 432 or 474 will result in a Code 64.

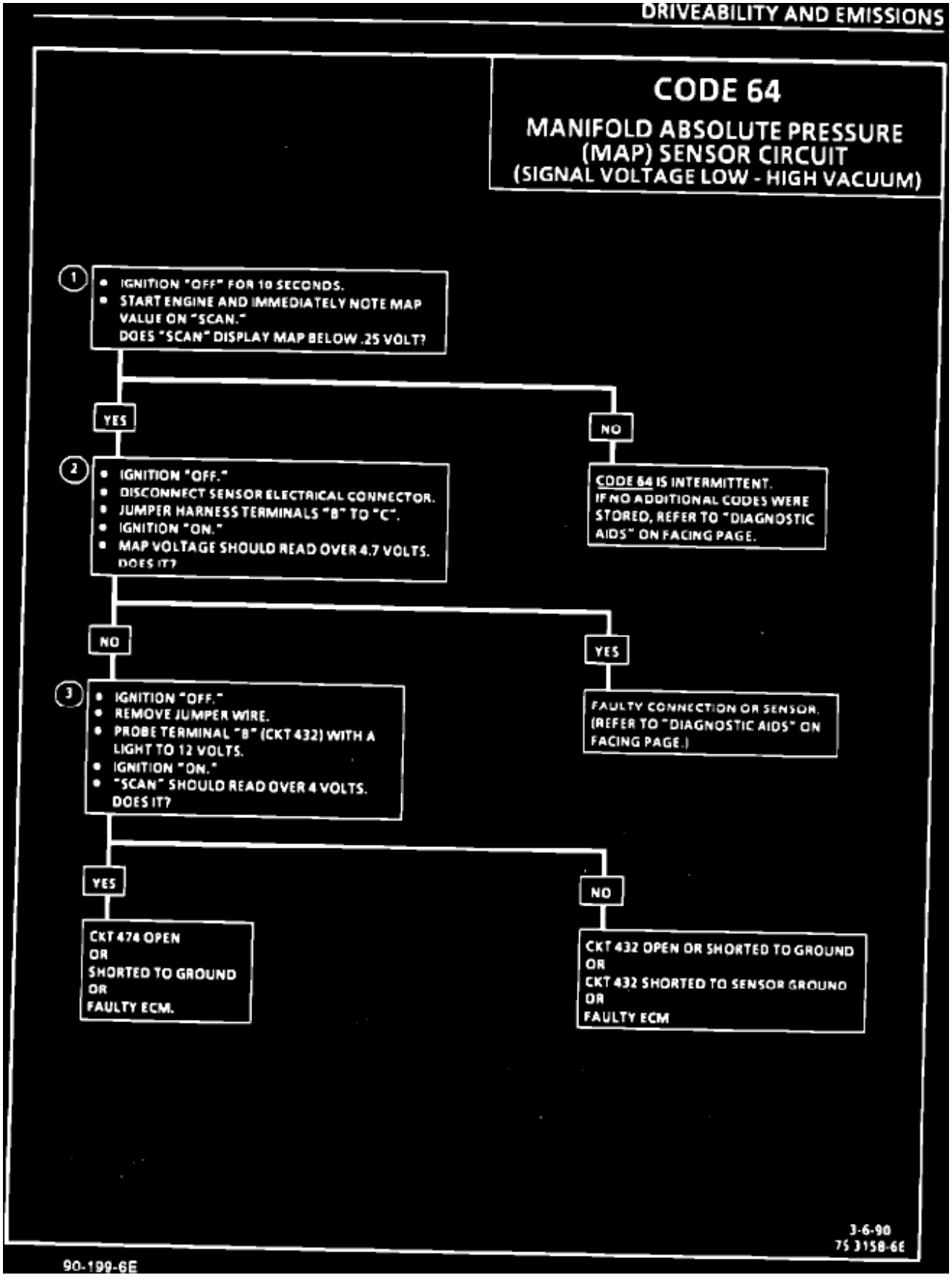
With the ignition "ON" and the engine "OFF," the manifold pressure is equal to atmospheric pressure and the signal voltage will be high. This information is used by the ECM as an indication of vehicle altitude.

Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same ± .4 volts. Also CHART C-1D can be used to test the MAP sensor. Refer to "Intermittents" in Section "B".

NOTE: Make sure electrical connector remains securely fastened.

- Check all connections.
- Disconnect sensor from bracket and twist sensor By hand (only) to check for intermittent connections. Output changes greater than .1 volt indicates a bad connector or connection. If OK, replace sensor.
- Refer to CHART C-1D, MAP sensor voltage output check for further diagnosis.

90-199-6E



- Diagnostic Chart Code 64.

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-90	Barometric, Manifold Absolute	3.8-5.5 @ 0-1000 3.6-5.3 @ 1000-200 3.5-5.1 @ 2000-300 3.3-5.0 @ 3000-400 3.2-4.8 @ 4000-500 3.0-4.6 @ 5000-600 2.9-4.5 @ 6000-700 2.5-4.3 @ 7000-

Engine	Year	Sensor	Voltage @ Altitude
All, as equipped	1981-88	Vacuum	.50-.64 @ ign. on 1.7-3.0*

* 10 in./250 mm applied to unit.

Manifold Pressure/Vacuum Sensor: Specifications

MANIFOLD ABSOLUTE, VACUUM AND BAROMETRIC PRESSURE SENSORS

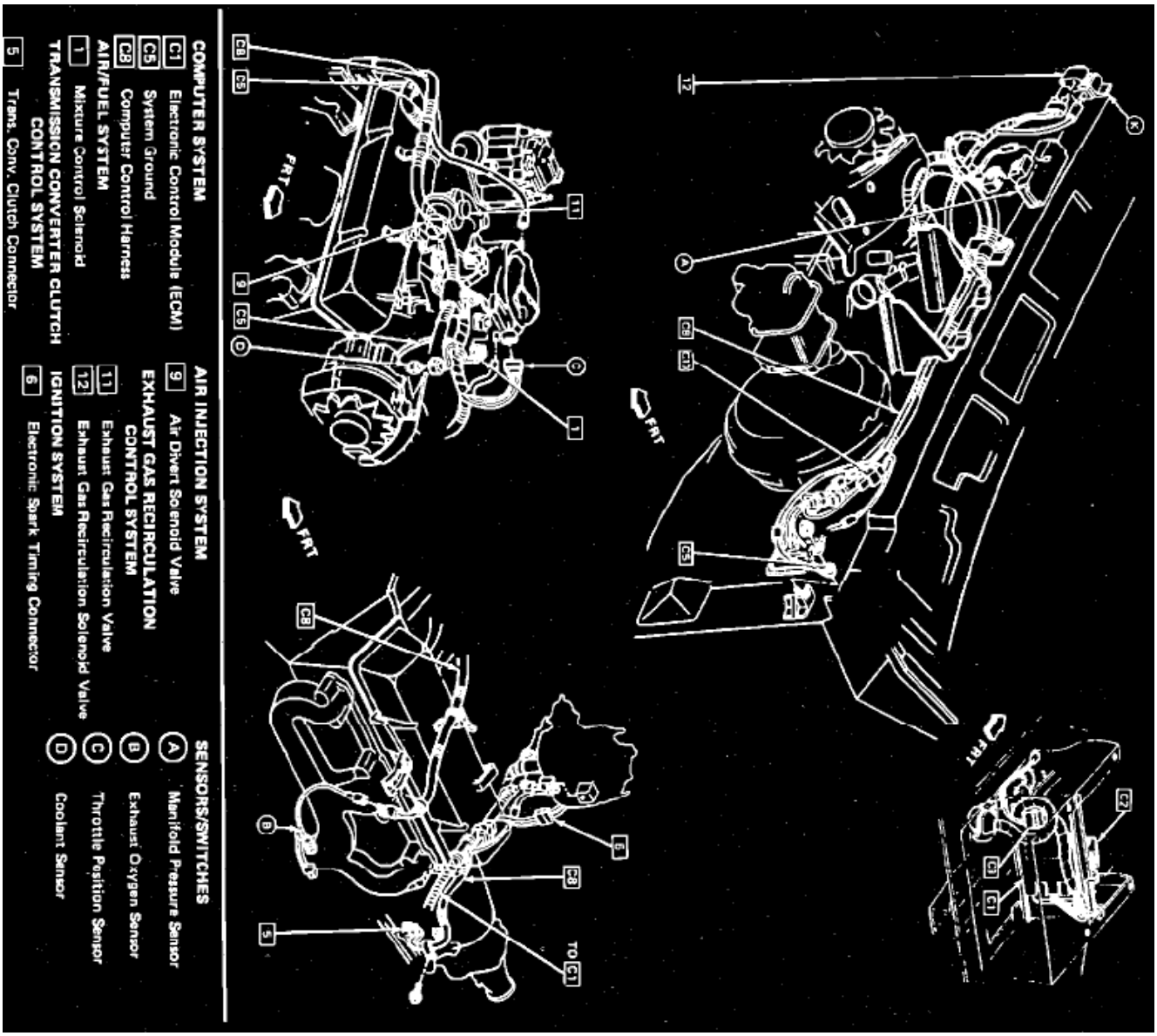
Engines may use one, or a combination of these sensors. All sensors appear the same. Manifold Absolute Pressure sensors have a vacuum line connected between the unit and manifold vacuum. On Barometric Pressure sensors, the line is not used and the connector is either open or has a filter installed over it. Pressure sensors also have a vacuum line between the sensor and intake manifold and only appear on carburetted models.

Barometric Pressure Sensors: Measure voltage with ignition on and engine off.

Manifold Absolute Pressure Sensors: Measure voltage with ignition on and engine off. Start engine and apply 10 in./ 250 mm Hg to unit, voltage should be 1.2-2.3 volts less.

Pressure Sensors: Measure voltage as indicated.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Computers and Control Systems > Sensors and Switches - Computers and Control Systems > Manifold Pressure/Vacuum Sensor > Component Information > Locations > Manifold Absolute Pressure (MAP) Sensor

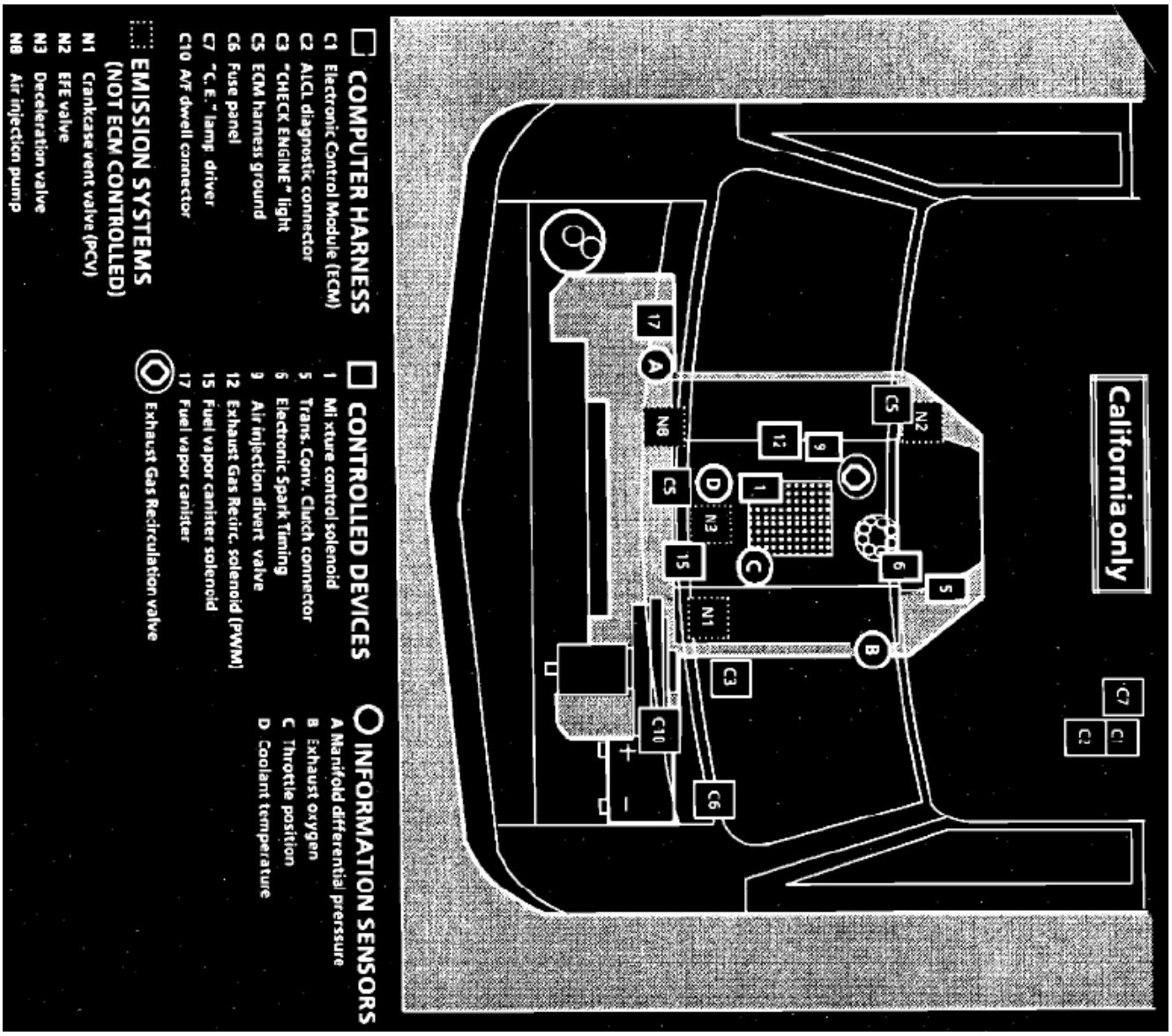


Manifold Pressure/Vacuum Sensor: Locations Manifold Absolute Pressure (MAP) Sensor

Engine Components.

Center Of Dash Panel

Applicable to: 1985 G Series w/V8



Manifold Pressure/Vacuum Sensor: Locations Manifold Differential Pressure Sensor

Underhood & Engine Components.

RH Side Of Dash Panel

Applicable to: 1985 G Series w/5.0L & 5.7L California

Manifold Pressure/Vacuum Sensor: Service and Repair

The MAP and Vacuum sensors are accessible through the engine compartment. The BARO sensor may be located either in the engine compartment or strapped to the ECM harness under the dash panel.

Other than checking for loose hoses and electrical connections, the only service required of these sensors is replacement should diagnosis show any sensors to be faulty.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Computers and Control Systems > Sensors and Switches - Computers and Control Systems > Oxygen Sensor > Component Information > Technical Service Bulletins > RTV Sealants - Use on Engines With Oxygen Sensors

Oxygen Sensor: Technical Service Bulletins RTV Sealants - Use on Engines With Oxygen Sensors

NUMBER: 86-B-28

GROUP: 6 - Gasoline Engine

DATE: March, 1986

SUBJECT: RTV (AEROBIC SEALANTS) AND ANAEROBIC SEALANTS FOR ENGINES EQUIPPED WITH OXYGEN SENSORS

MODELS: 1981-86 C, K, G, S, T, M, AND CABALLEROS WITH YF5 CALIFORNIA EMISSIONS
1985-86 S, T, AND M WITH 2.5L EFI AND NA

Incorrect usage of RTV sealants (cure in the presence of air) may cause damage to vehicle components such as oxygen sensors. This is caused by silica particles collecting on the oxygen sensor and contaminating the sensor. The correct application for RTV sealants is listed in the WDDGM parts book. The correct RTV sealants to use on engines in GMC Trucks are part numbers 1052914 or 1052917 (black) or part number 1052915 (clear). Red RTV sealant, part number 1052366, is for use on rear axle differential covers only, as it contains silica. Anaerobic sealers (cure without the presence of air) part numbers 1052756, 1052943, and 1052942 are also used to seal the rear main bearing cap to the block on engines used in GMC Trucks. See the chart below for a description of General Motors service approved RTV silicone and anaerobic sealers.

GENERAL MOTORS SERVICE APPROVED RTV SILICONE SEALANTS

Part Name Color Part Number Size Application

GMS (Type B) Black 1052914 300 ml. Caulker All Light

1052917 3 oz. Tube Duty Engines Except 2.5L

GMS (Type A) Clear 1052915 300 ml. Caulker 2.5L 4 Cylinder

GMS Red 1052366 3 oz. Tube Rear Axle Usage Only

GENERAL MOTORS SERVICE APPROVED ANAEROBIC SEALANTS

Part Name Part Number Size Application

Loctite (R) Gasket Maker 1052942 6 ml. Engine Anaerobic Applications

1052943 50 ml.

1052756 6 ml.

Loctite (R) Transmission Case Cover 1052756 6 ml. Transmission Case Covers

Sealant

Loctite (R) Trim Bonding Adhesive 1052621 4 gm. Trim, Super Glue

Loctite (R) Pipe Sealant w/Teflon 1052080 50 ml. Pipe Sealant

Loctite (R) Thread Locking Kit 1052624 10 ml. Thread Locking, Retaining Compound

Loctite (R) Inside Mirror Adhesive Kit 1052369 0.4 cc. Inside Rear View Mirror

GENERAL MOTORS OTHER APPROVED SEALANTS

Part Name Part Number Application

Gasket Sealing Compound 1050026 Gasket Sealing

Adhesive Caulking Kit 9636067 Windshield, Back Glass, Anywhere Urethane Based Sealer Is Required

Oxygen Sensor: Technical Service Bulletins Oxygen Sensors - Silica Contamination

Model Year: 1981

Bulletin No: 81-I-37

File In Group: 60

Number: 11

Date: Feb. 81

Subject: Silica Contamination of Oxygen Sensors and Gelation of Oil.

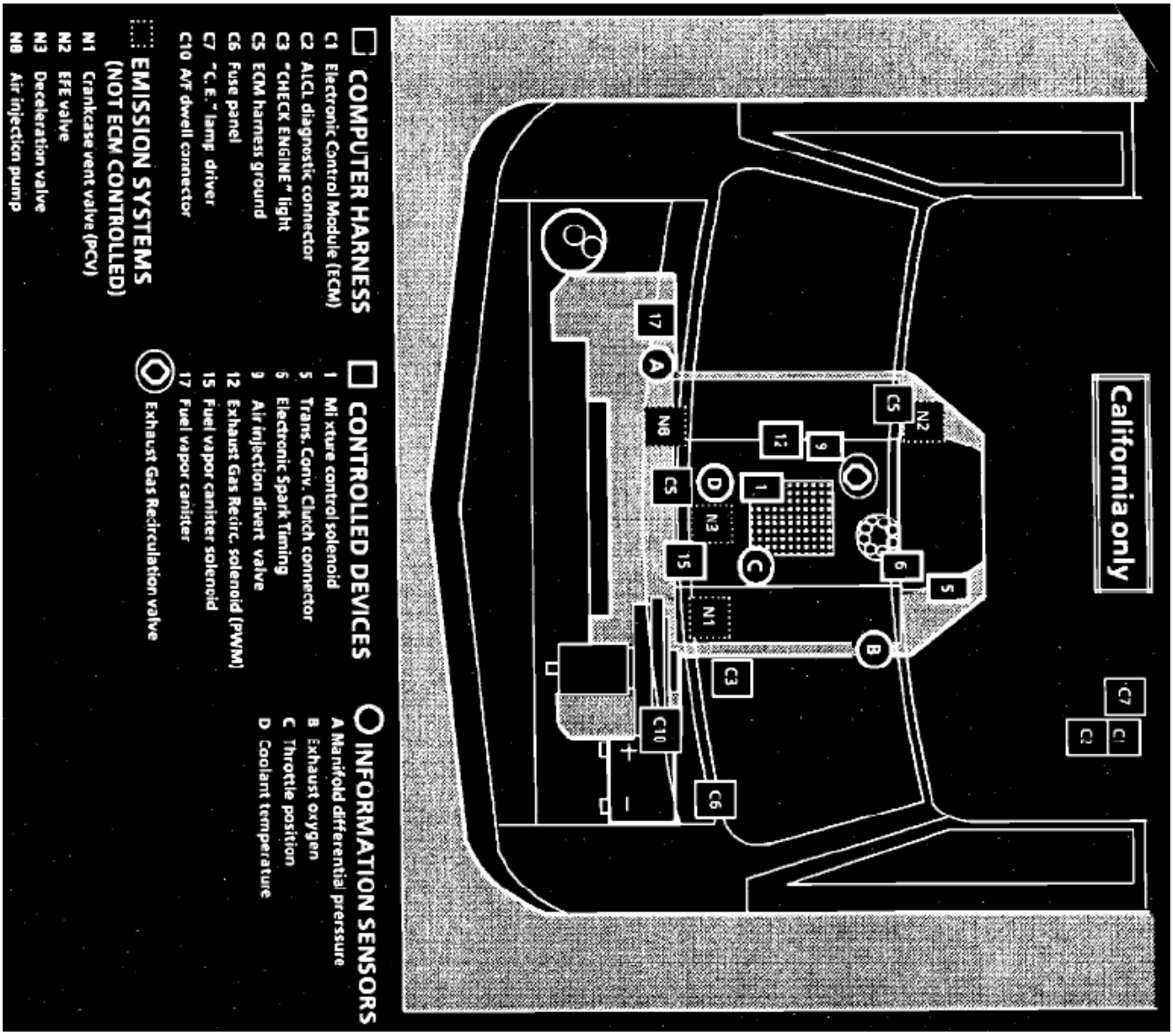
Models Affected: All

Oxygen sensor performance can deteriorate if certain RTV silicone gasket materials are used. Other RTV's when used with certain oils, may cause gelation of the oil. The degree of performance severity depends on the type of RTV and application of the engine involved.

Therefore, when repairing engines where this item is involved, it is important to use either cork composition gaskets or RTV silicone gasket material approved for such use. GMS (General Motors Sealant) or equivalent material can be used. GMS is available through GMPD with the following part numbers:

1052366 3 oz.

1052434 10.14 oz.

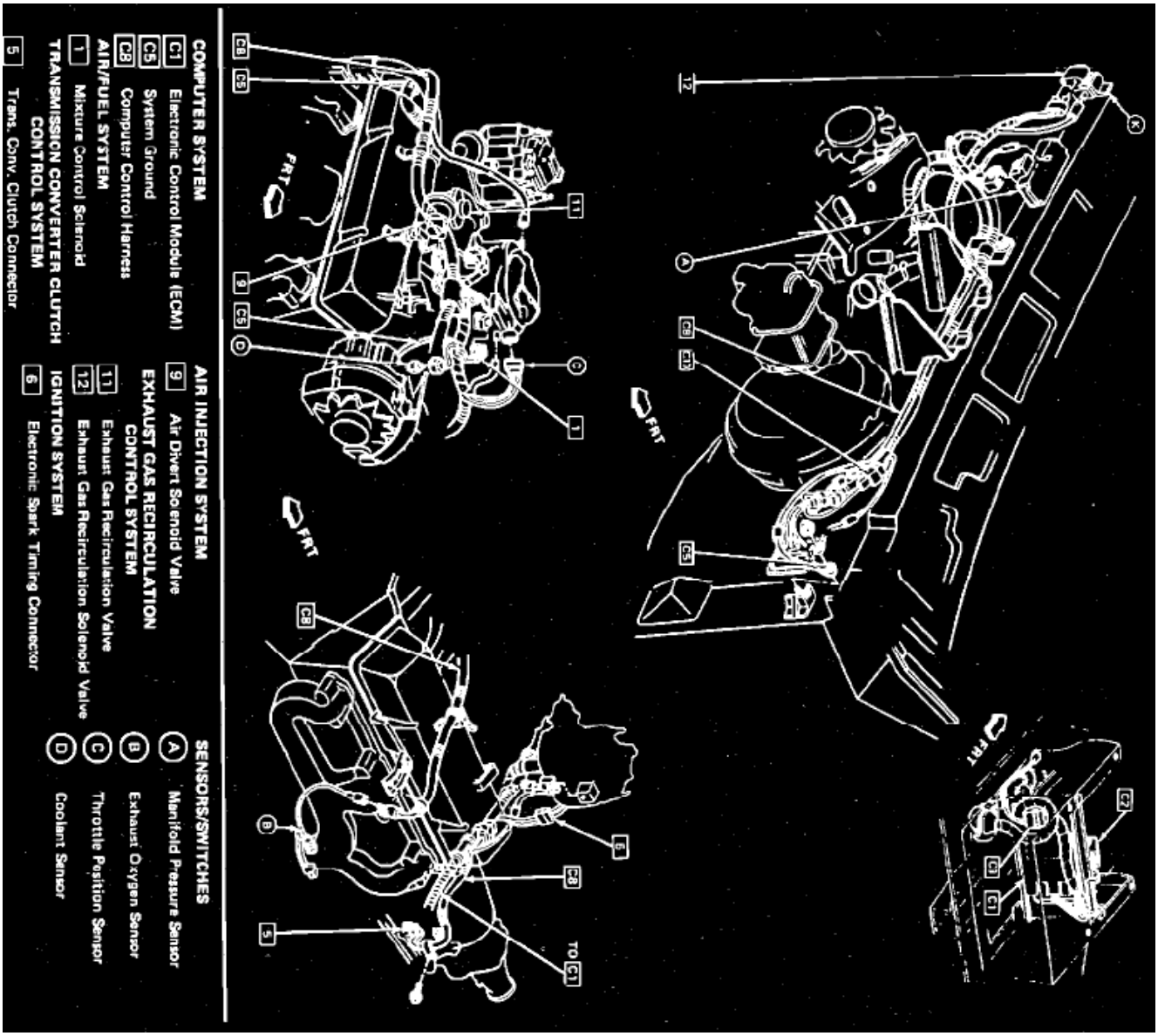


Oxygen Sensor: Locations California

Underhood & Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Oxygen Sensor: Locations Except California

Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

Oxygen Sensor: Description and Operation

The exhaust oxygen sensor is located in the exhaust system and monitors oxygen content in the exhaust gas stream. Varying concentration of oxygen in the exhaust gas causes the O2 sensor to produce a varying voltage output. By monitoring the O2 sensor output voltage, the ECM can determine the amount of oxygen in the exhaust gas and adjust the air/fuel mixture accordingly.

Rich air/fuel ratio = low oxygen content and high signal output (0.45-1.0 volt) Lean air/fuel ratio = high oxygen content and low signal output (below 0.45 volt).

Oxygen Sensor: Service and Repair

The oxygen sensor has a permanently attached pig-tail and connector. This pig-tail should not be removed, since removal will affect proper operation of oxygen sensor.

1. Disconnect electrical connector from oxygen sensor.

2. Using a suitable wrench, carefully remove sensor from exhaust manifold or pipe. The oxygen sensor may be difficult to remove when engine temperature is below 120°F. Use caution, since excessive force may damage threads in exhaust manifold or pipe.

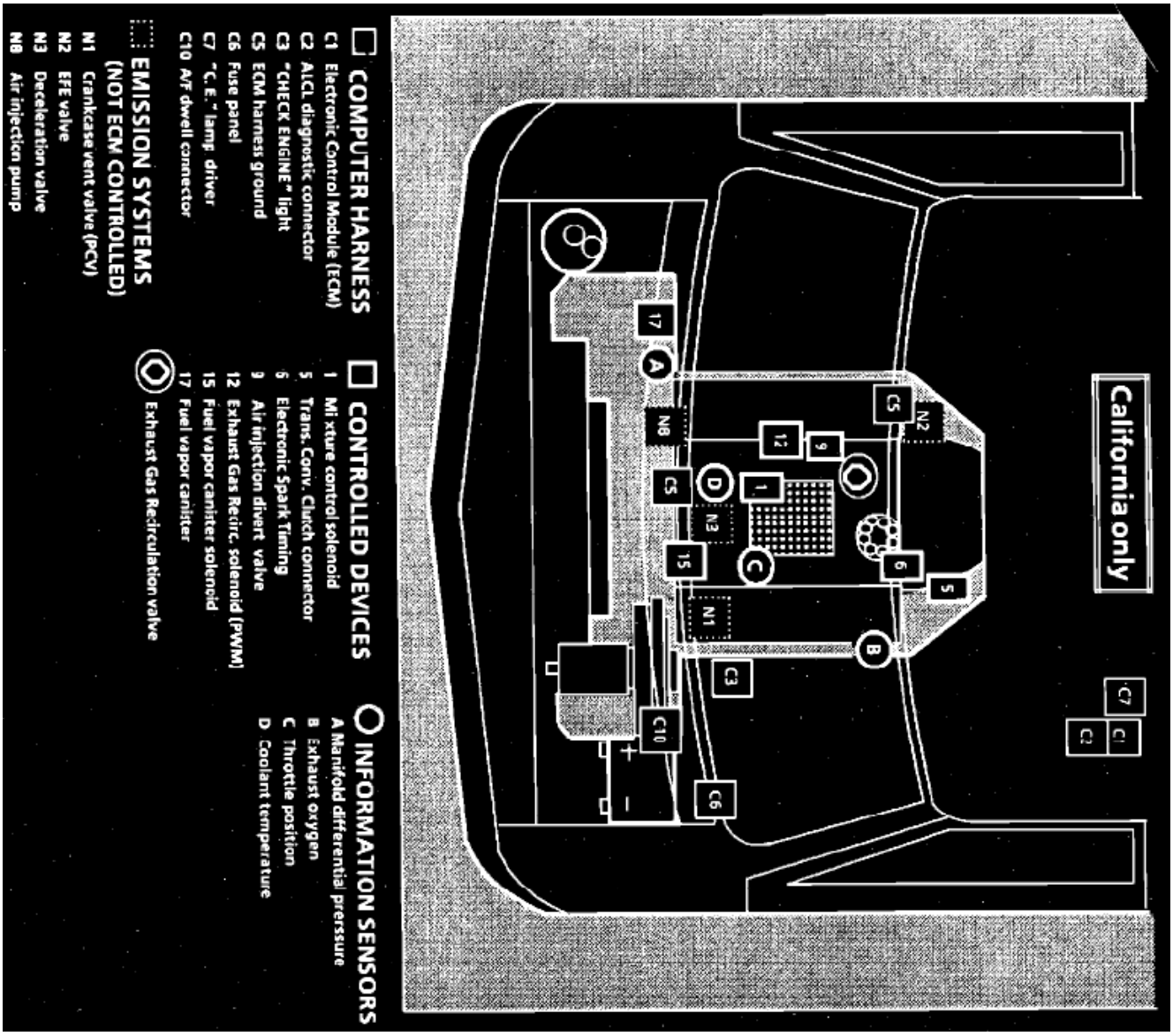
3. If new sensor is being used, install sensor into manifold or pipe.

4. If old sensor is being reused, coat threads with anti-seize compound, Part No. 5613695 or equivalent, then install into manifold or pipe.

5. Torque oxygen sensor to 30 ft. lbs., then reconnect electrical connector.

Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Fig. 16 Throttle Position Sensor Specifications

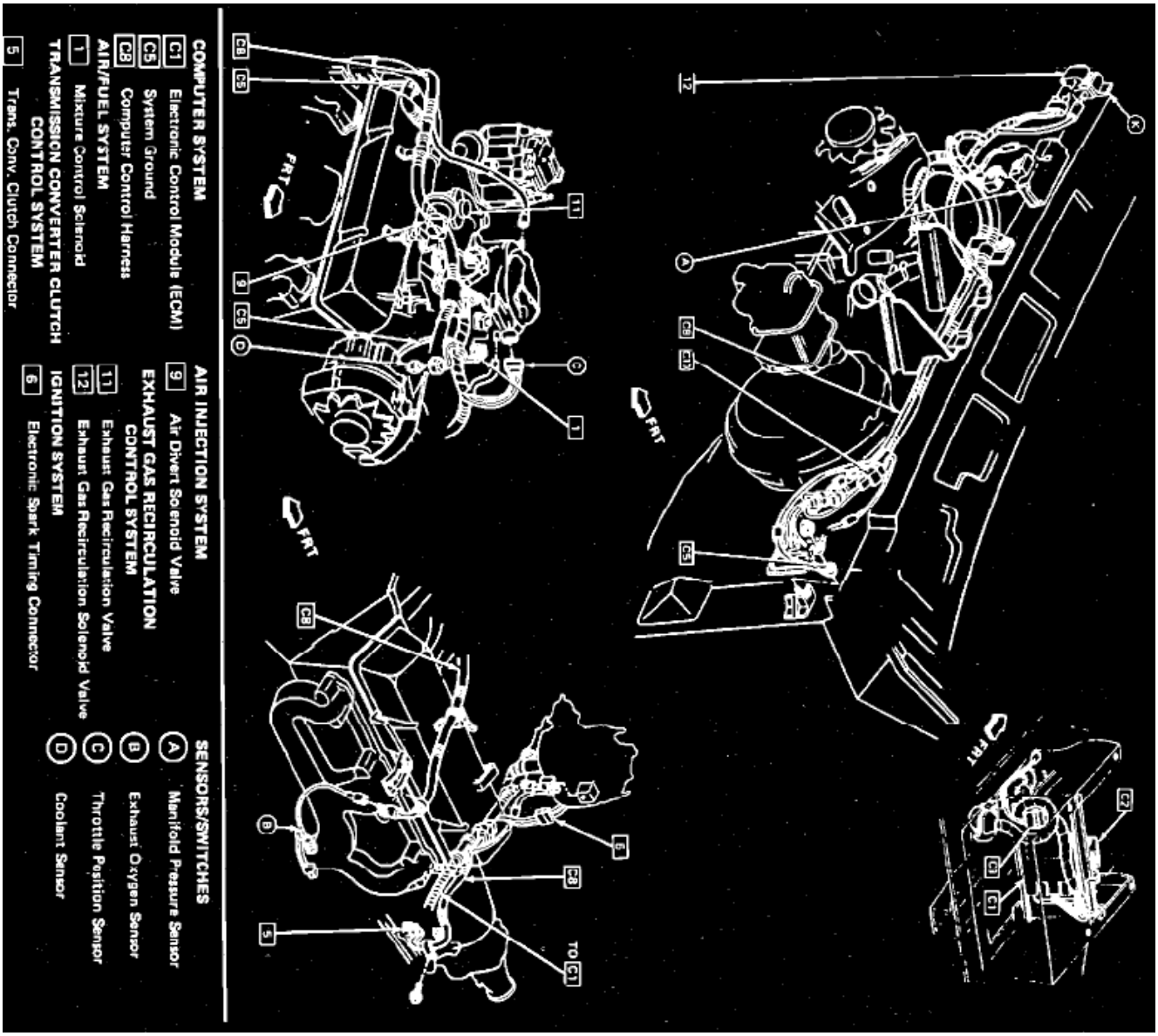


Throttle Position Sensor: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Throttle Position Sensor: Locations Except California

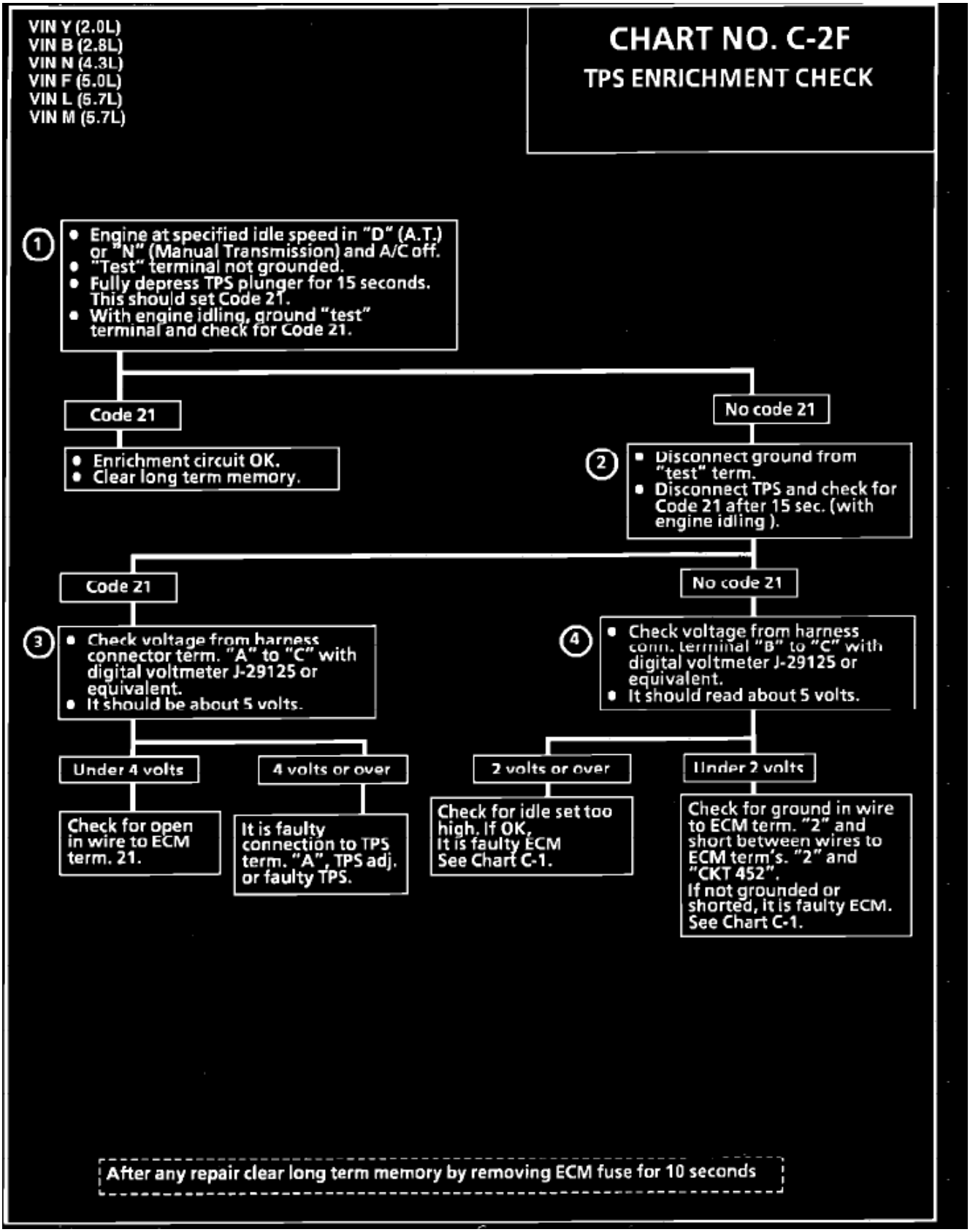
Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

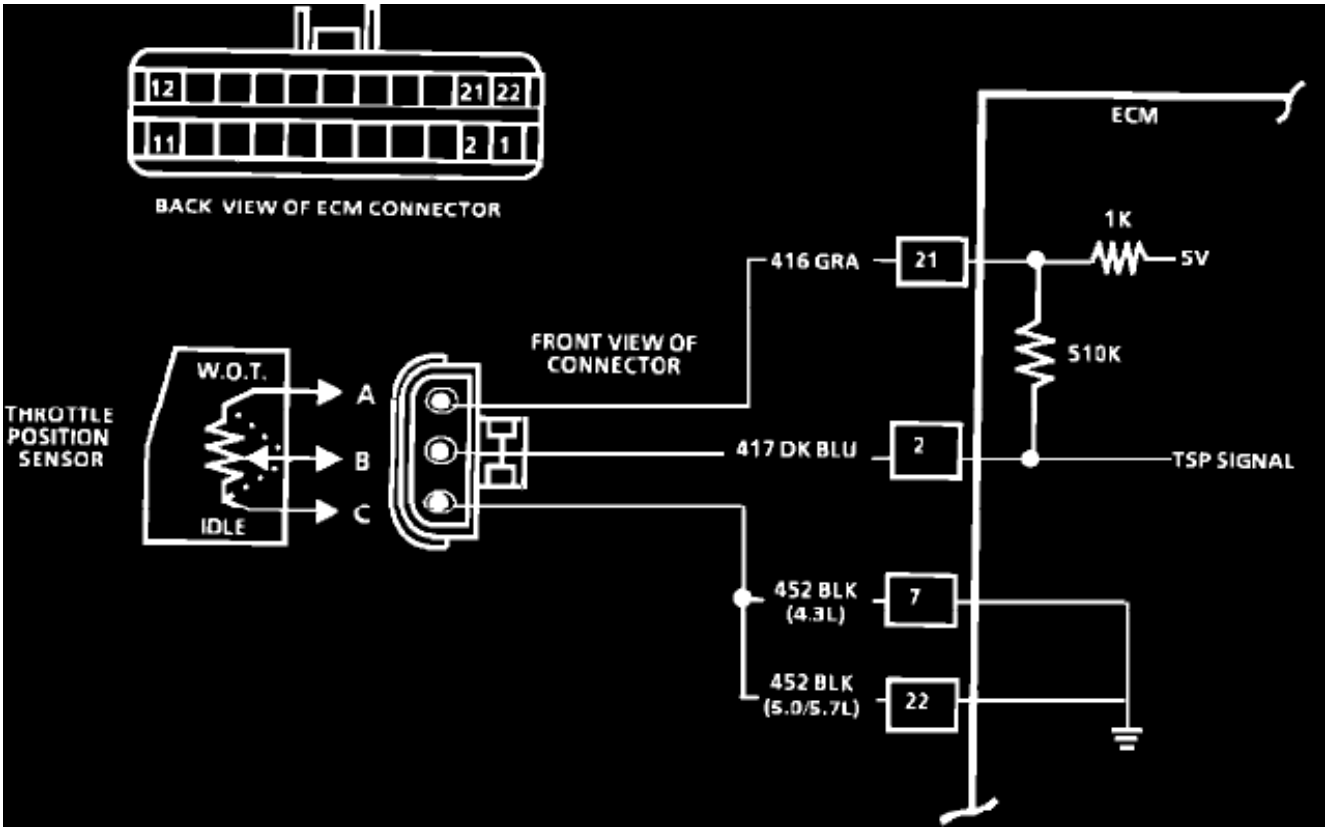
Throttle Position Sensor: Description and Operation

The TPS is mounted in the carburetor body and is moved by the accelerator pump linkage. When the throttle blades are closed, the TPS provides a low voltage (under 1 volt). This voltage signal will increase to up to 5 volts as the throttle blades are opened to wide open throttle. These voltage signals provide an indication of throttle position to the ECM.


VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART NO. C-2F
TPS ENRICHMENT CHECK
1
Engine at specified idle speed in "D" (A.T.) or "N" (Manual Transmission) and A/C off.
"Test" terminal not grounded.
Fully depress TPS plunger for 15 seconds. This should set Code 21.
With engine idling, ground "test" terminal and check for Code 21.
Code 21
Enrichment circuit OK.
Clear long term memory.
No code 21
2
Disconnect ground from "test" term.
Disconnect TPS and check for Code 21 after 15 sec. (with engine idling).
Code 21
3
Check voltage from harness connector term. "A" to "C" with digital voltmeter J-29125 or equivalent.
It should be about 5 volts.
Under 4 volts
Check for open in wire to ECM term. 21.
4 volts or over
It is faulty connection to TPS term. "A", TPS adj. or faulty TPS.
No code 21
4
Check voltage from harness conn. terminal "B" to "C" with digital voltmeter J-29125 or equivalent.
It should read about 5 volts.
2 volts or over
Check for idle set too high. If OK, It is faulty ECM See Chart C-1.
Under 2 volts
Check for ground in wire to ECM term. "2" and short between wires to ECM term's. "2" and "CKT 452". If not grounded or shorted, it is faulty ECM. See Chart C-1.
After any repair clear long term memory by removing ECM fuse for 10 seconds

Throttle Position Sensor: Testing and Inspection

Chart C-2F - TPS Enrichment Check



Wiring Diagram for Chart C-2F - TPS Enrichment Check

CHART C-2F - TPS ENRICHMENT CHECK

Test Description:

1. This step checks that the TPS will cause an ECM "Rich" command when fully depressed manually. On some vehicles, this will cause a low dwell (full rich). On others it will not.

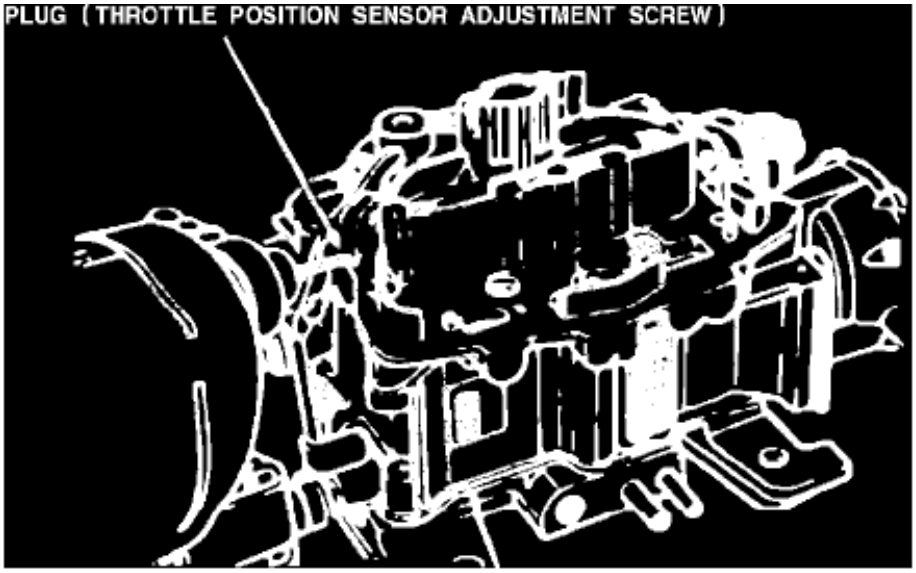
Code 21 should normally be set.

2. This step distinguishes between a faulty TPS or ECM harness/ECM.

Code 21 should normally be set, if engine RPM is not set above specifications.

3. This step checks for 5V. ref. at TPS. It should be about 5 volts. If loss of V. Ref were in the ECM, it should set Codes 21, 32 and 34 since this is the same 5V to VAC Sensor. Therefore, it must be an open in the wire.

4. This step checks for a grounded circuit. Normal circuit should read about 5 volts. Checking for grounded TPS output to Terminal "2" of ECM, or short in CKT 417 and 452 from TPS, indicates whether fault is in wiring or ECM. A voltmeter with a 10 megohms resistance must be used for an accurate reading.



Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.20	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Throttle Position Sensor: Adjustments

Fig. 15 Throttle Position Sensor Adjustment Screw Cover Removal

Fig. 16 Throttle Position Sensor Specifications

Do not remove plug sealing TPS adjustment or adjust TPS unless carburetor is overhauled or ``Computer Command Control (C3)'' system

diagnosis indicates a problem with the switch.

1. Drill a .078 (5/64) inch hole, 1/16-1/8 inch deep, in plug covering TPS adjustment, Fig. 15.

2. Thread a No. 8 sheet metal screw into hole and pry out plug using a suitable lever.

3. Remove TPS adjusting screw using tool J-28696 or equivalent.

4. Leaving electrical connector in place, connect a digital voltmeter between TPS center terminal (B) and bottom terminal (C), using jumper wires if necessary. Only a digital voltmeter with 10 megohm input impedance or higher can be used. Conventional voltmeters do not have sufficient resistance to obtain accurate readings.

5. With ignition on, engine stopped and A/C off, install TPS screw and adjust quickly to obtain specified TPS idle voltage, Fig. 16.

6. Turn ignition off and install new plug over TPS adjusting screw or seal opening with RTV sealer.

Throttle Position Sensor: Service and Repair

To replace Throttle Position Sensor it is necessary to remove the air horn assembly from the carburetor.

1. Remove or disconnect electrical connectors from M/C solenoid and TPS assembly.

2. Air horn removal:

a. Remove upper choke lever from end of choke shaft by removing attaching screw. Rotate upper choke lever to remove lever from choke link.

b. Remove choke link from lower lever inside the float bowl casting. Remove link by holding lower lever outward with small screwdriver and twisting link counter-clockwise.

c. Remove the retainer from the pump link, and remove link from lever. DO NOT remove pump lever from air horn.

d. Remove vacuum break hose from tube on float bowl.

e. Remove air horn-to-bowl screws; then remove the two countersunk attaching screws located next to the venturi.

f. Remove air horn from bowl by lifting it straight up. (Gasket should remain on float bowl).

3. Remove solenoid-metering rod plunger by lifting straight up.

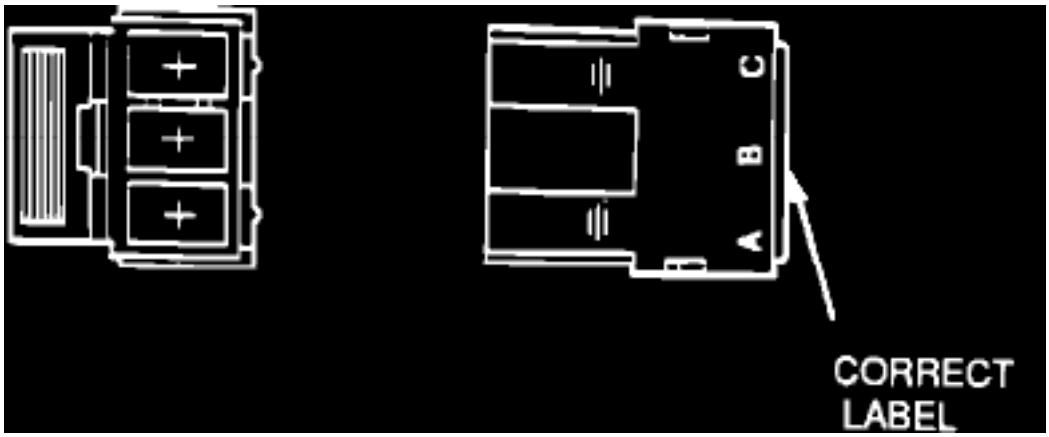
4. Remove air horn gasket by lifting it from the bowl locating pins on the float bowl. DISREGARD GASKET.

5. Remove float bowl insert.

6. Remove metering rods and springs.

7. Remove throttle position sensor by pushing up from bottom of electrical connector and remove TPS and connector assembly from bowl.

8. Reverse procedure to install new TPS sensor using new air horn gasket.



Vehicle Speed Sensor: Technical Service Bulletins Electrical - VSS Connector Mislabeled

GMC NUMBER: 88-T-145

GROUP: 6D-Engine Electrical

DATE: August, 1988

CORPORATE NUMBER:

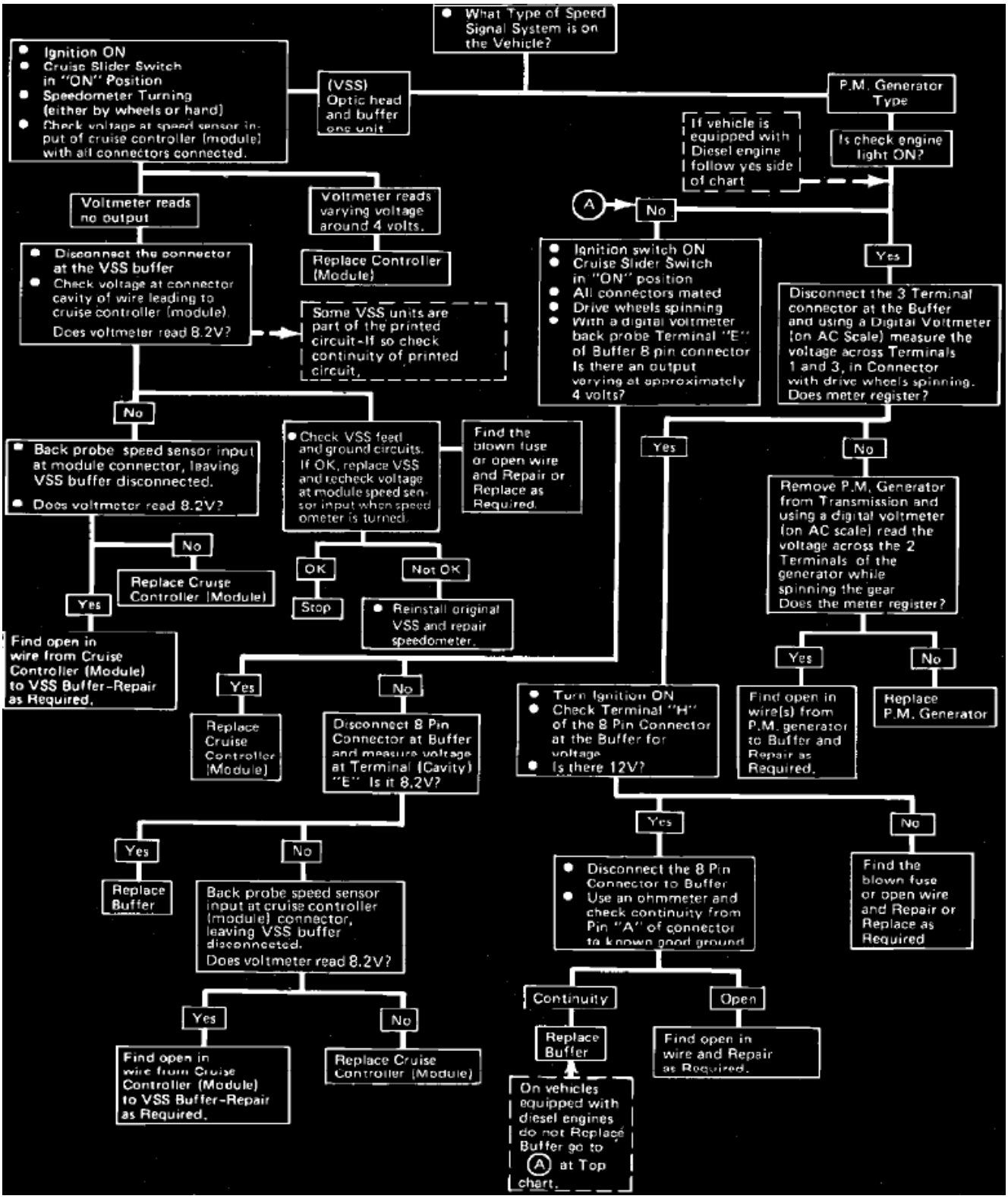
818107

SUBJECT: CONNECTOR MISLABELED

MODELS: 1985-88 G, S, R, AND M VEHICLES

FIGURE NO. 1VEHICLE SPEED SENSOR BUFFER CORRECT CONNECTOR LABEL

Some 1985-88 vehicles may have an electrical connector at the vehicle speed sensor (VSS), which is improperly labeled. The connector will work properly but could cause confusion if electrical troubleshooting is necessary. Figure No. 1 shows a properly labeled connector. The improperly labeled connectors have the "A" and "C" reversed. All Service Manual terminal call-outs use the labeling as shown in Figure No. 1.



Vehicle Speed Sensor: Testing and Inspection

Fig. 17 Speed Sensor System Test (Custom Cruise III)

Refer to Fig. 17 to check speed sensor and related wiring.

Vehicle Speed Sensor: Service and Repair

The Vehicle Speed Sensor is located behind the speedometer cluster. To replace sensor proceed as follows:

1. Remove speedometer cluster to gain access to sensor.

2. Disconnect sensor electrical connectors.

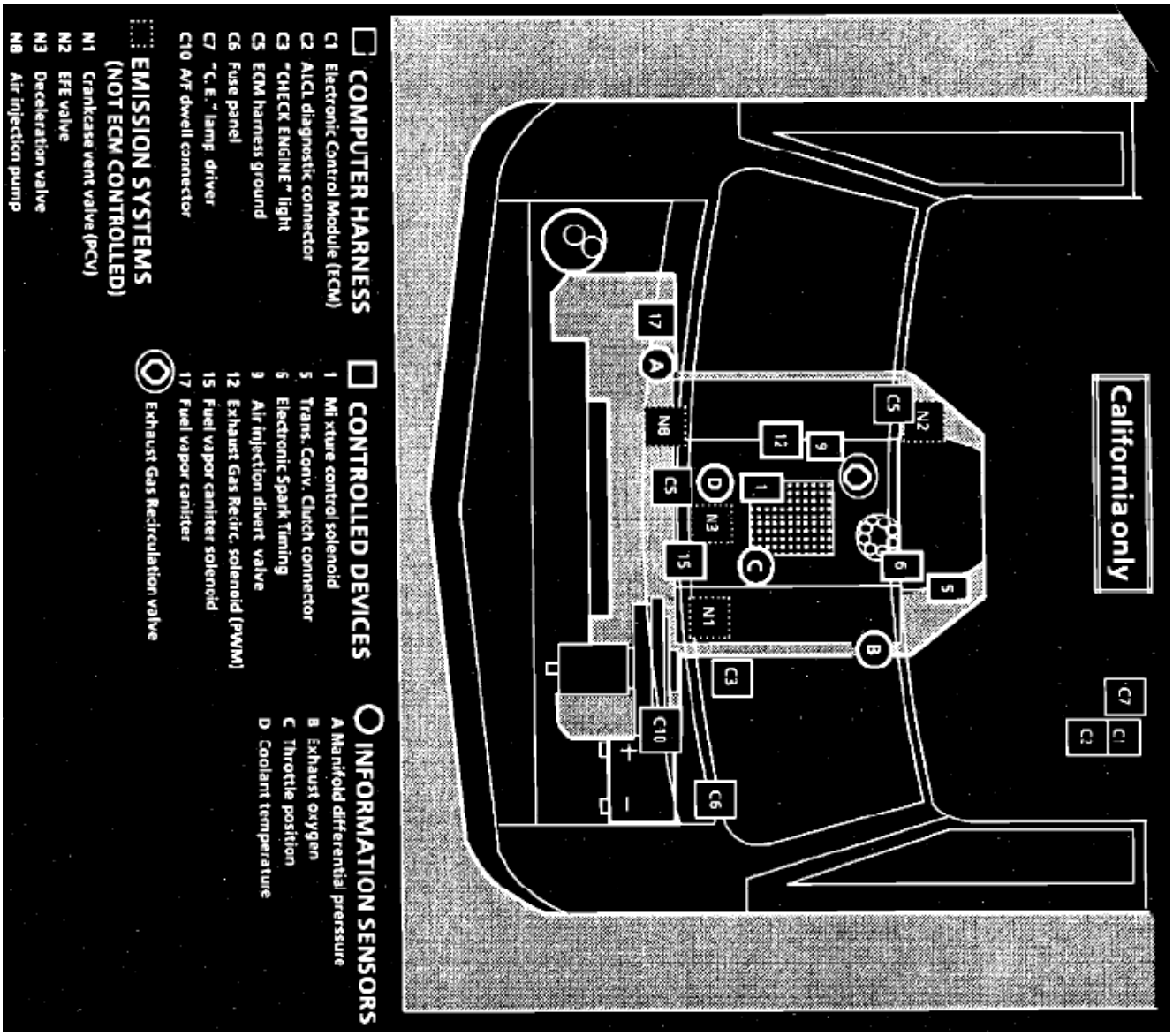
3. Remove sensor retaining screw and the sensor.

4. Reverse procedure to install.

Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Fig. 16 Throttle Position Sensor Specifications

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Computers and Control Systems > Throttle Position Sensor > Component Information > Locations > California

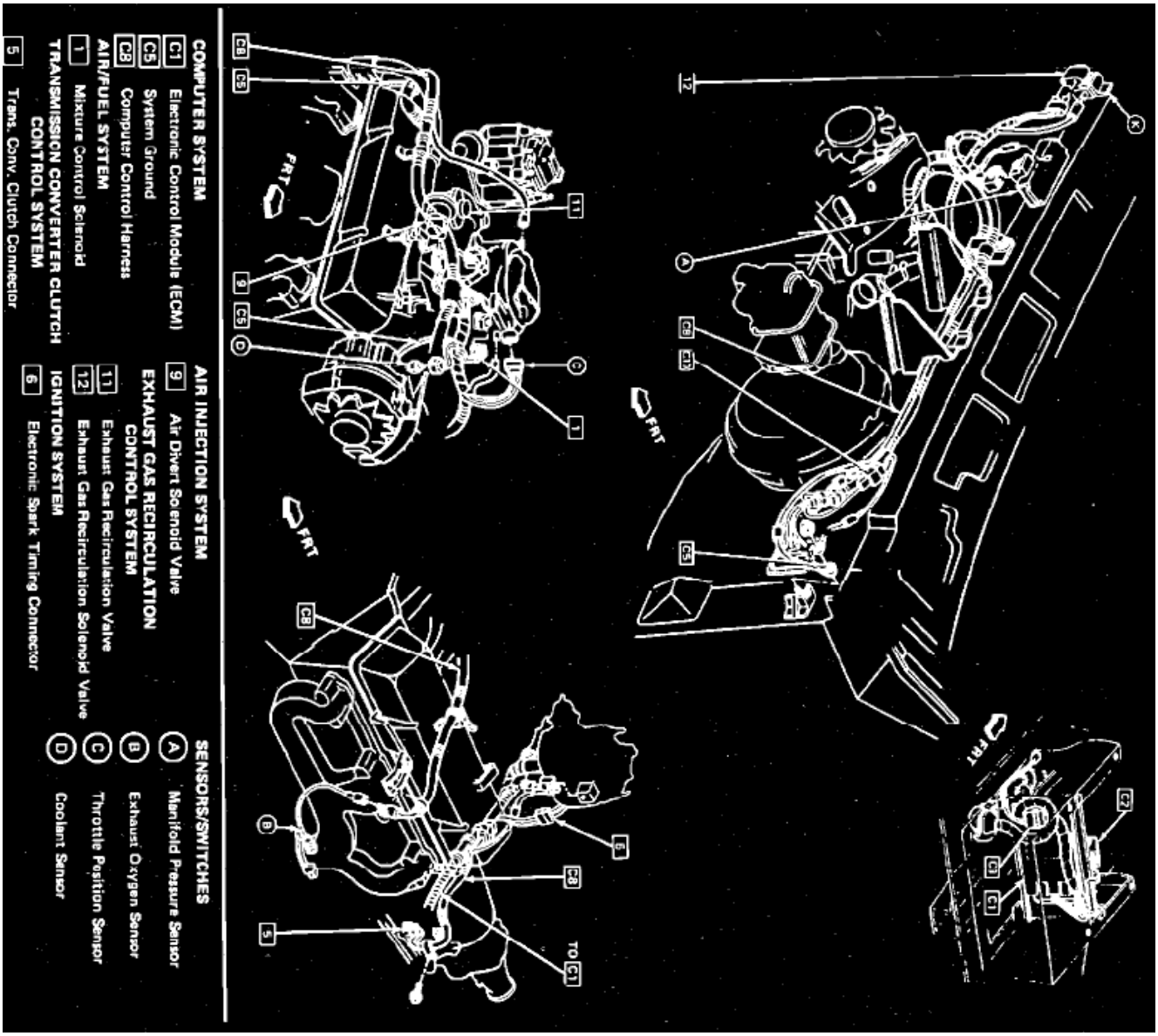


Throttle Position Sensor: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Throttle Position Sensor: Locations Except California

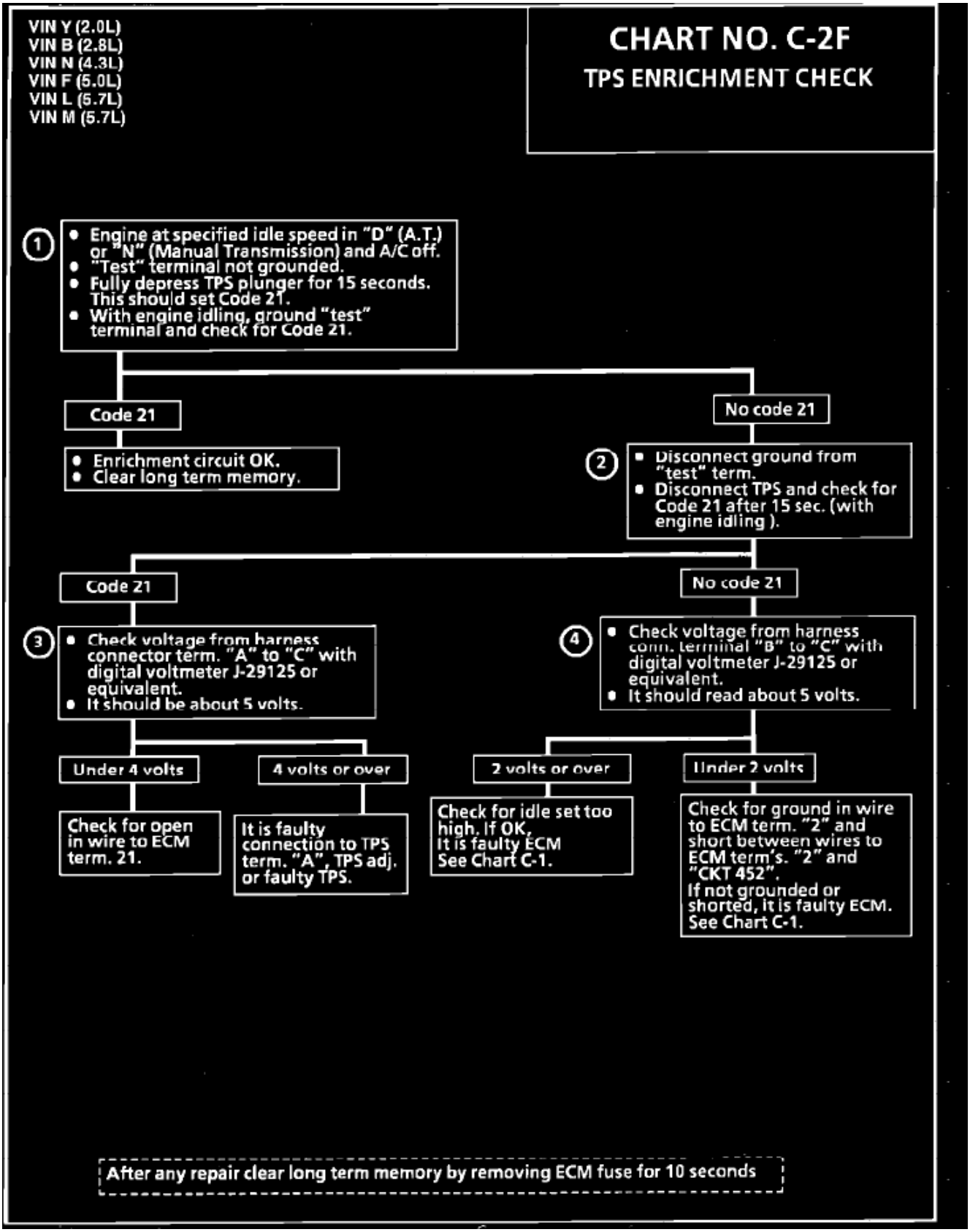
Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

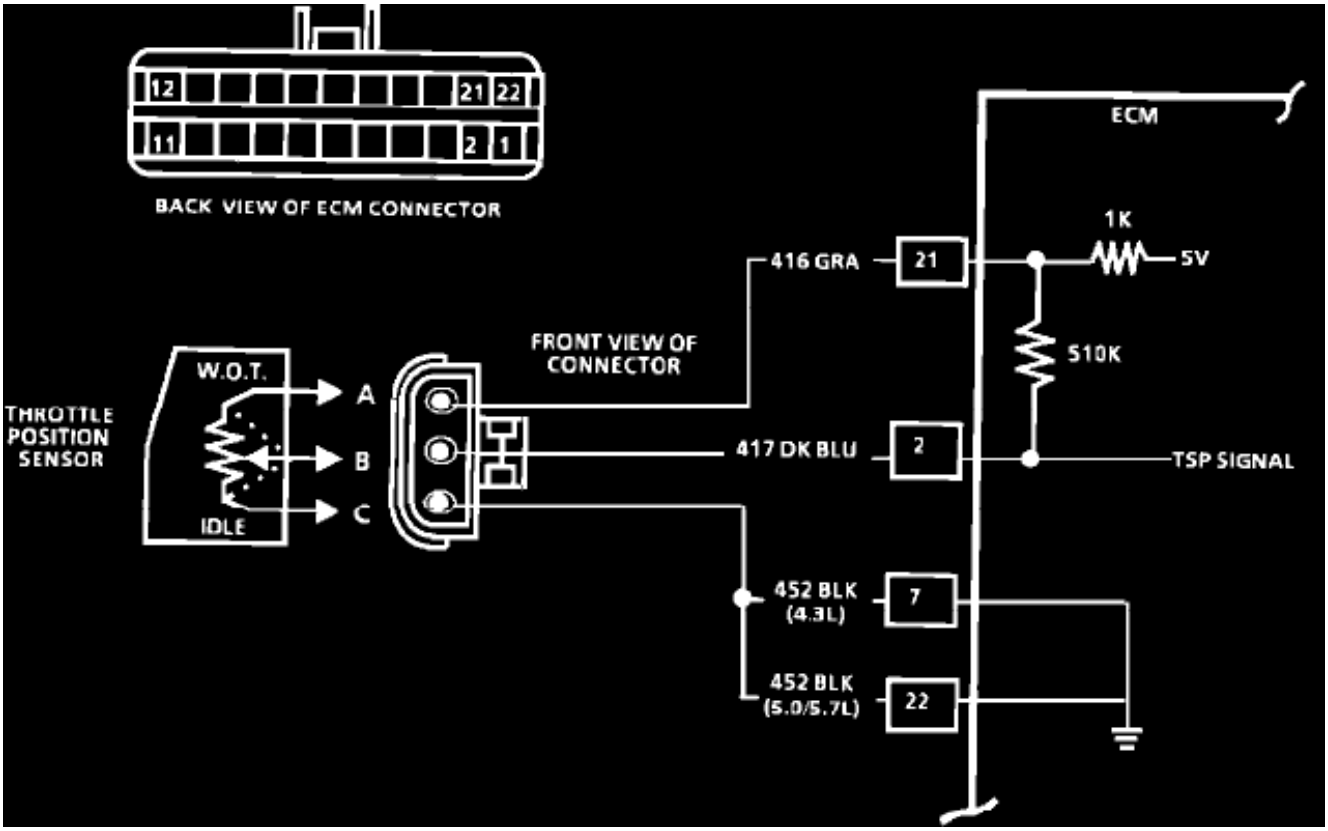
Throttle Position Sensor: Description and Operation

The TPS is mounted in the carburetor body and is moved by the accelerator pump linkage. When the throttle blades are closed, the TPS provides a low voltage (under 1 volt). This voltage signal will increase to up to 5 volts as the throttle blades are opened to wide open throttle. These voltage signals provide an indication of throttle position to the ECM.


VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART NO. C-2F
TPS ENRICHMENT CHECK
1
Engine at specified idle speed in "D" (A.T.) or "N" (Manual Transmission) and A/C off.
"Test" terminal not grounded.
Fully depress TPS plunger for 15 seconds. This should set Code 21.
With engine idling, ground "test" terminal and check for Code 21.
Code 21
Enrichment circuit OK.
Clear long term memory.
No code 21
2
Disconnect ground from "test" term.
Disconnect TPS and check for Code 21 after 15 sec. (with engine idling).
Code 21
3
Check voltage from harness connector term. "A" to "C" with digital voltmeter J-29125 or equivalent.
It should be about 5 volts.
Under 4 volts
Check for open in wire to ECM term. 21.
4 volts or over
It is faulty connection to TPS term. "A", TPS adj. or faulty TPS.
No code 21
4
Check voltage from harness conn. terminal "B" to "C" with digital voltmeter J-29125 or equivalent.
It should read about 5 volts.
2 volts or over
Check for idle set too high. If OK, It is faulty ECM See Chart C-1.
Under 2 volts
Check for ground in wire to ECM term. "2" and short between wires to ECM term's. "2" and "CKT 452". If not grounded or shorted, it is faulty ECM. See Chart C-1.
After any repair clear long term memory by removing ECM fuse for 10 seconds

Throttle Position Sensor: Testing and Inspection

Chart C-2F - TPS Enrichment Check



Wiring Diagram for Chart C-2F - TPS Enrichment Check

CHART C-2F - TPS ENRICHMENT CHECK

Test Description:

1. This step checks that the TPS will cause an ECM "Rich" command when fully depressed manually. On some vehicles, this will cause a low dwell (full rich). On others it will not.

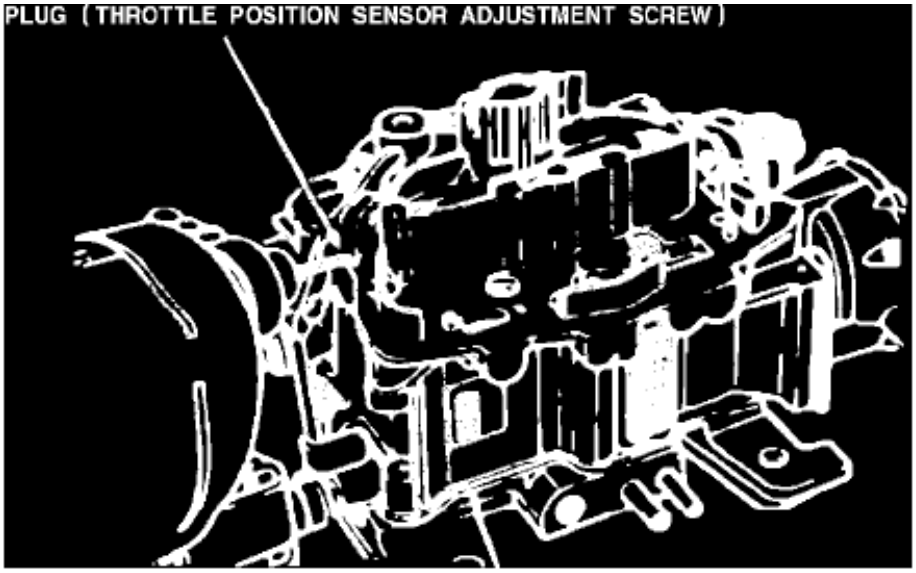
Code 21 should normally be set.

2. This step distinguishes between a faulty TPS or ECM harness/ECM.

Code 21 should normally be set, if engine RPM is not set above specifications.

3. This step checks for 5V. ref. at TPS. It should be about 5 volts. If loss of V. Ref were in the ECM, it should set Codes 21, 32 and 34 since this is the same 5V to VAC Sensor. Therefore, it must be an open in the wire.

4. This step checks for a grounded circuit. Normal circuit should read about 5 volts. Checking for grounded TPS output to Terminal "2" of ECM, or short in CKT 417 and 452 from TPS, indicates whether fault is in wiring or ECM. A voltmeter with a 10 megohms resistance must be used for an accurate reading.



Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.20	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Throttle Position Sensor: Adjustments

Fig. 15 Throttle Position Sensor Adjustment Screw Cover Removal

Fig. 16 Throttle Position Sensor Specifications

Do not remove plug sealing TPS adjustment or adjust TPS unless carburetor is overhauled or ``Computer Command Control (C3)'' system

diagnosis indicates a problem with the switch.

1. Drill a .078 (5/64) inch hole, 1/16-1/8 inch deep, in plug covering TPS adjustment, Fig. 15.

2. Thread a No. 8 sheet metal screw into hole and pry out plug using a suitable lever.

3. Remove TPS adjusting screw using tool J-28696 or equivalent.

4. Leaving electrical connector in place, connect a digital voltmeter between TPS center terminal (B) and bottom terminal (C), using jumper wires if necessary. Only a digital voltmeter with 10 megohm input impedance or higher can be used. Conventional voltmeters do not have sufficient resistance to obtain accurate readings.

5. With ignition on, engine stopped and A/C off, install TPS screw and adjust quickly to obtain specified TPS idle voltage, Fig. 16.

6. Turn ignition off and install new plug over TPS adjusting screw or seal opening with RTV sealer.

Throttle Position Sensor: Service and Repair

To replace Throttle Position Sensor it is necessary to remove the air horn assembly from the carburetor.

1. Remove or disconnect electrical connectors from M/C solenoid and TPS assembly.

2. Air horn removal:

a. Remove upper choke lever from end of choke shaft by removing attaching screw. Rotate upper choke lever to remove lever from choke link.

b. Remove choke link from lower lever inside the float bowl casting. Remove link by holding lower lever outward with small screwdriver and twisting link counter-clockwise.

c. Remove the retainer from the pump link, and remove link from lever. DO NOT remove pump lever from air horn.

d. Remove vacuum break hose from tube on float bowl.

e. Remove air horn-to-bowl screws; then remove the two countersunk attaching screws located next to the venturi.

f. Remove air horn from bowl by lifting it straight up. (Gasket should remain on float bowl).

3. Remove solenoid-metering rod plunger by lifting straight up.

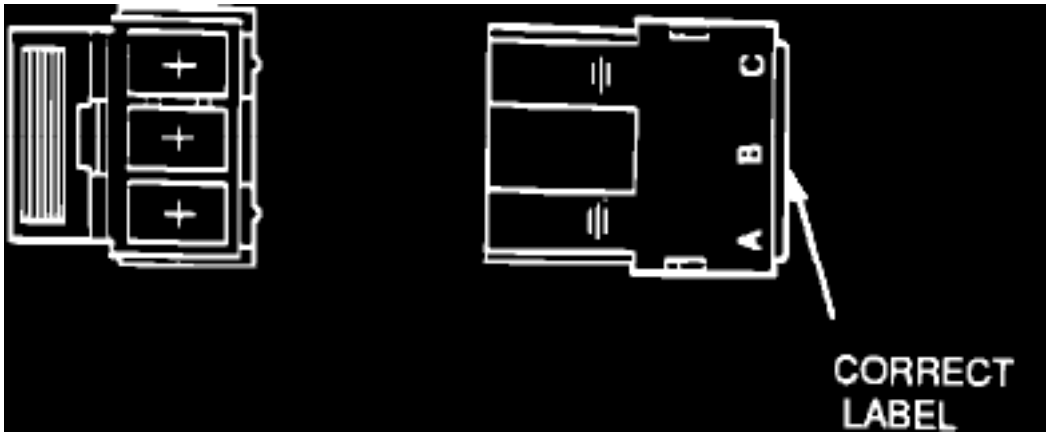
4. Remove air horn gasket by lifting it from the bowl locating pins on the float bowl. DISREGARD GASKET.

5. Remove float bowl insert.

6. Remove metering rods and springs.

7. Remove throttle position sensor by pushing up from bottom of electrical connector and remove TPS and connector assembly from bowl.

8. Reverse procedure to install new TPS sensor using new air horn gasket.



Vehicle Speed Sensor: Technical Service Bulletins Electrical - VSS Connector Mislabeled

GMC NUMBER: 88-T-145

GROUP: 6D-Engine Electrical

DATE: August, 1988

CORPORATE NUMBER:

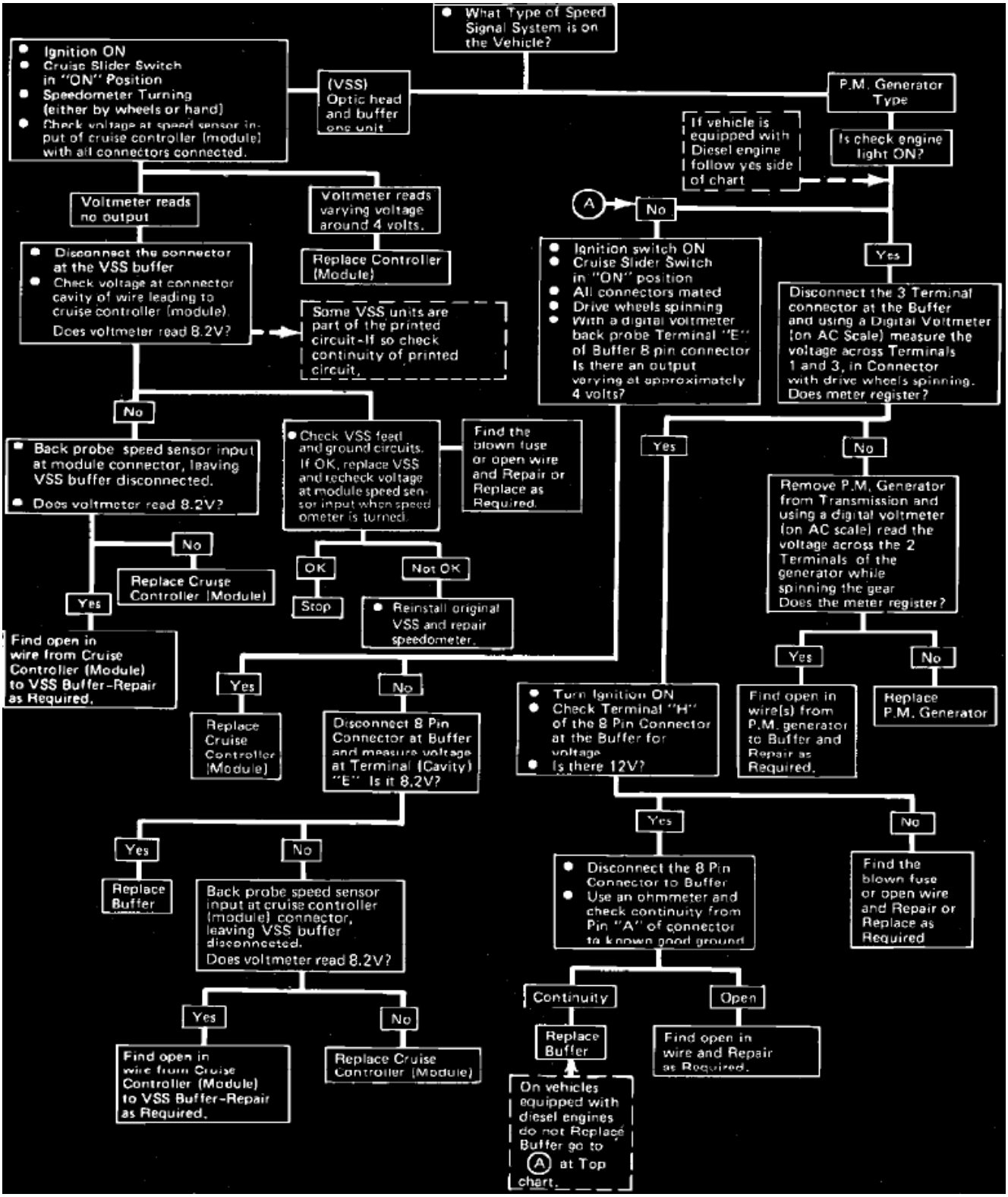
818107

SUBJECT: CONNECTOR MISLABELED

MODELS: 1985-88 G, S, R, AND M VEHICLES

FIGURE NO. 1VEHICLE SPEED SENSOR BUFFER CORRECT CONNECTOR LABEL

Some 1985-88 vehicles may have an electrical connector at the vehicle speed sensor (VSS), which is improperly labeled. The connector will work properly but could cause confusion if electrical troubleshooting is necessary. Figure No. 1 shows a properly labeled connector. The improperly labeled connectors have the "A" and "C" reversed. All Service Manual terminal call-outs use the labeling as shown in Figure No. 1.



Vehicle Speed Sensor: Testing and Inspection

Fig. 17 Speed Sensor System Test (Custom Cruise III)

Refer to Fig. 17 to check speed sensor and related wiring.

Vehicle Speed Sensor: Service and Repair

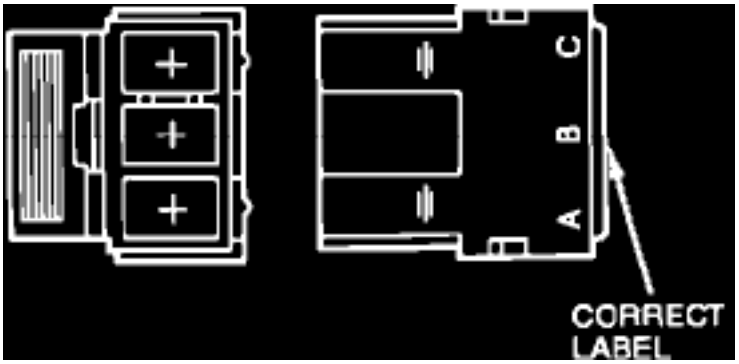
The Vehicle Speed Sensor is located behind the speedometer cluster. To replace sensor proceed as follows:

1. Remove speedometer cluster to gain access to sensor.

2. Disconnect sensor electrical connectors.

3. Remove sensor retaining screw and the sensor.

4. Reverse procedure to install.



Vehicle Speed Sensor Signal Buffer: Technical Service Bulletins Electrical - Speed Sensor Buffer Connector Labeled Wrong

REISSUE Number:

88-302-6E

Section: 6E

Date: AUGUST, 1988

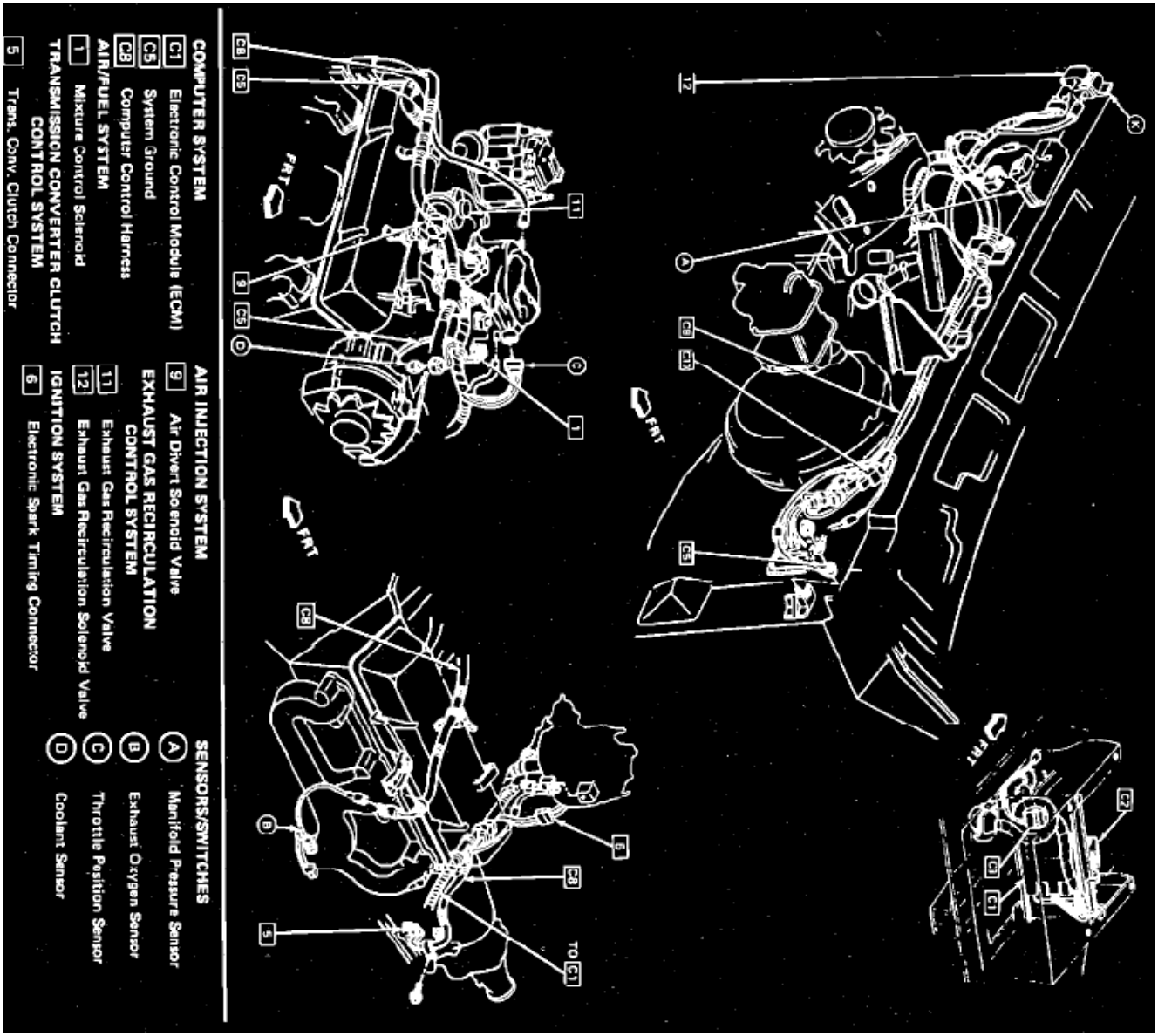
Subject: SHOP MANUAL UPDATE: SPEED SENSOR BUFFER CONNECTOR LABELING

Model and Year: 1985-88 CAPRICE, MONTE CARLO, CAVALIER, G-VAN, M-VAN, SUBURBAN, BLAZER

TO: ALL CHEVROLET DEALERS

Chevrolet Dealer service Bulletin 88-302-6E dated July, 1988, is being reissued to include the illustration. All copies of the original bulletin should be discarded.

Some 1985-88 vehicles may have an electrical connector for the vehicle speed sensor buffer which is improperly labeled. The connector will work properly but could cause confusion if electrical troubleshooting is necessary. Figure 1 shows a properly labeled connector. The improperly labeled connectors have the "A" and "C" reversed. All Service Manual terminal call-outs use the labeling as shown in the illustration.

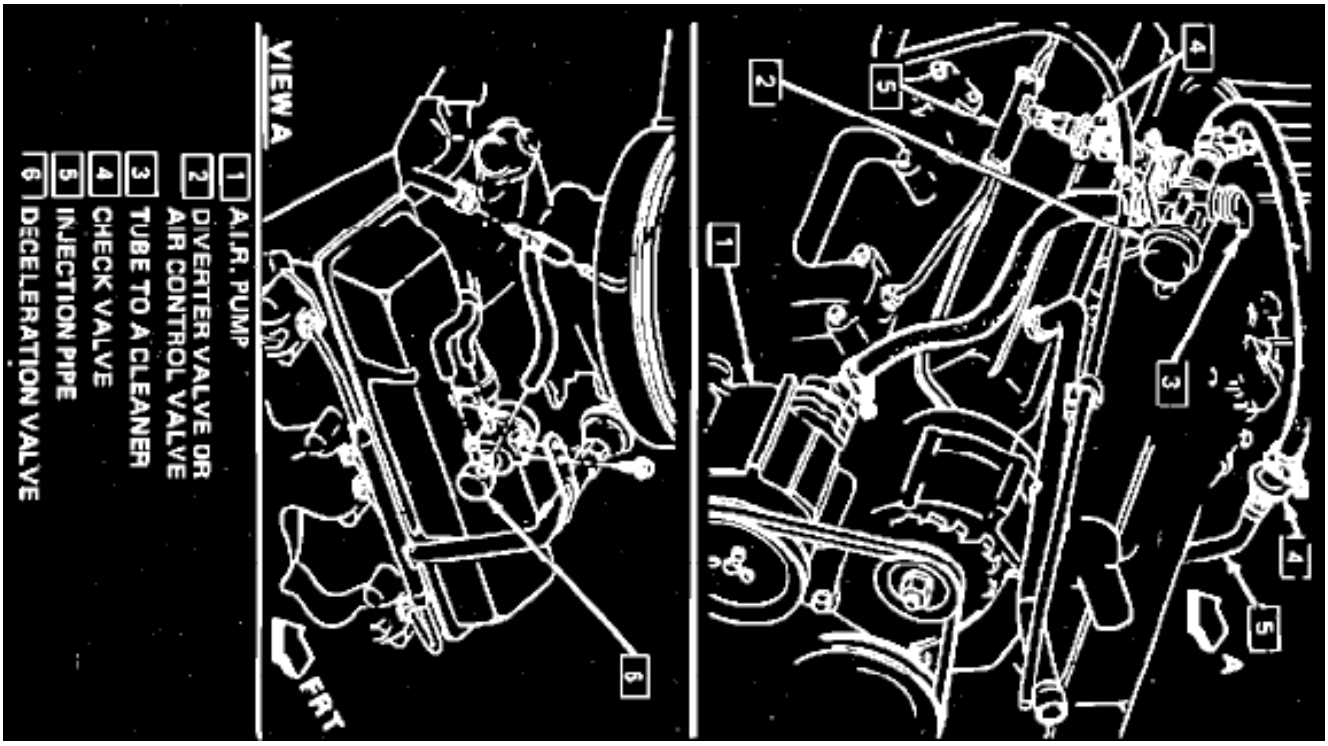


Air Diverter Solenoid: Locations

Engine Components.

RH Side Top Of Engine

Applicable to: 1985 G Series w/V8

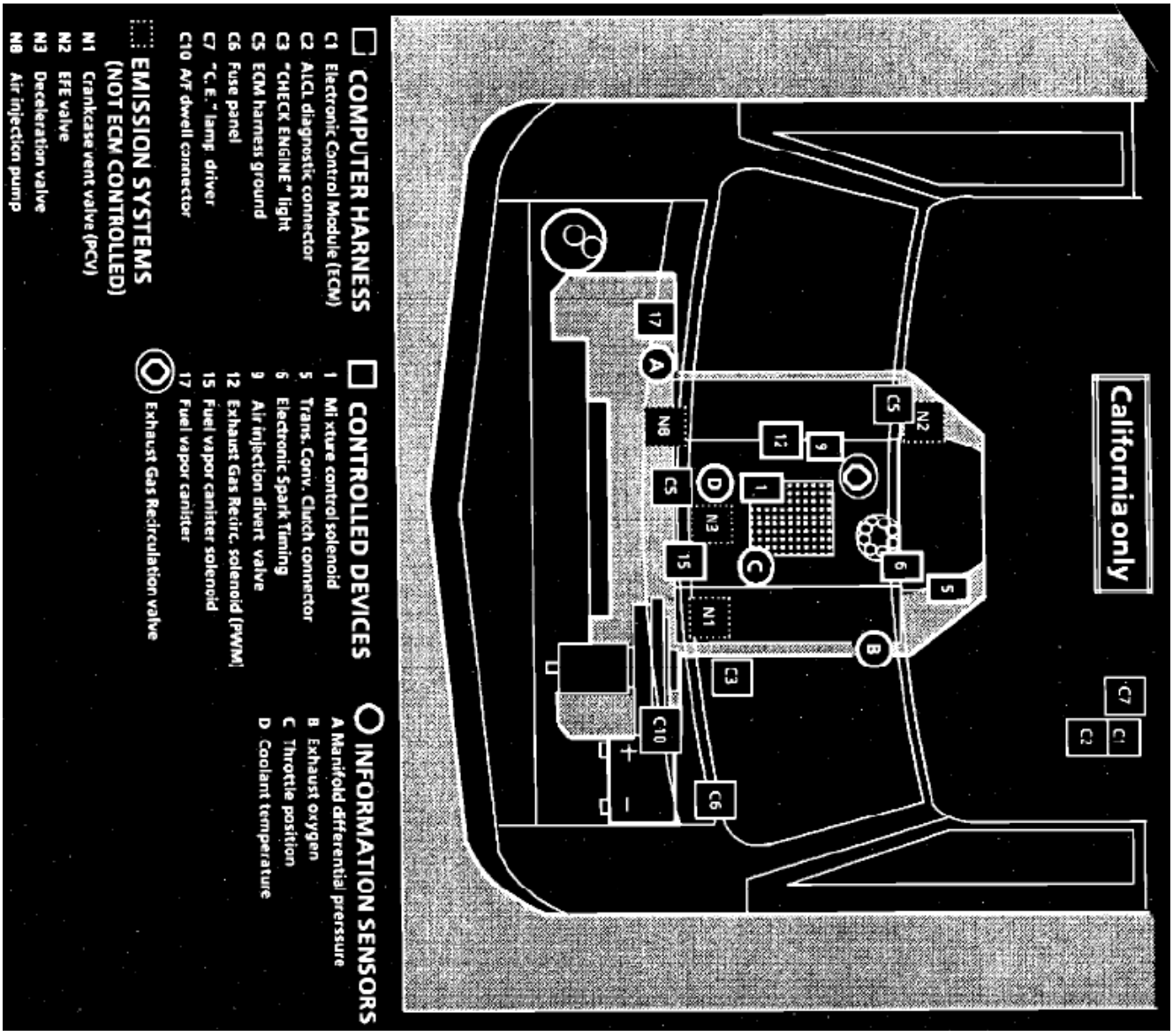


Electric Air Control Valve: Locations Air Diverter Valve

LH & RH Sides Of Engine.

On RH Side Top Of Engine

Applicable to: 1985 V8 & Light Duty Emissions



Electric Air Control Valve: Locations Air Injection Divert Valve

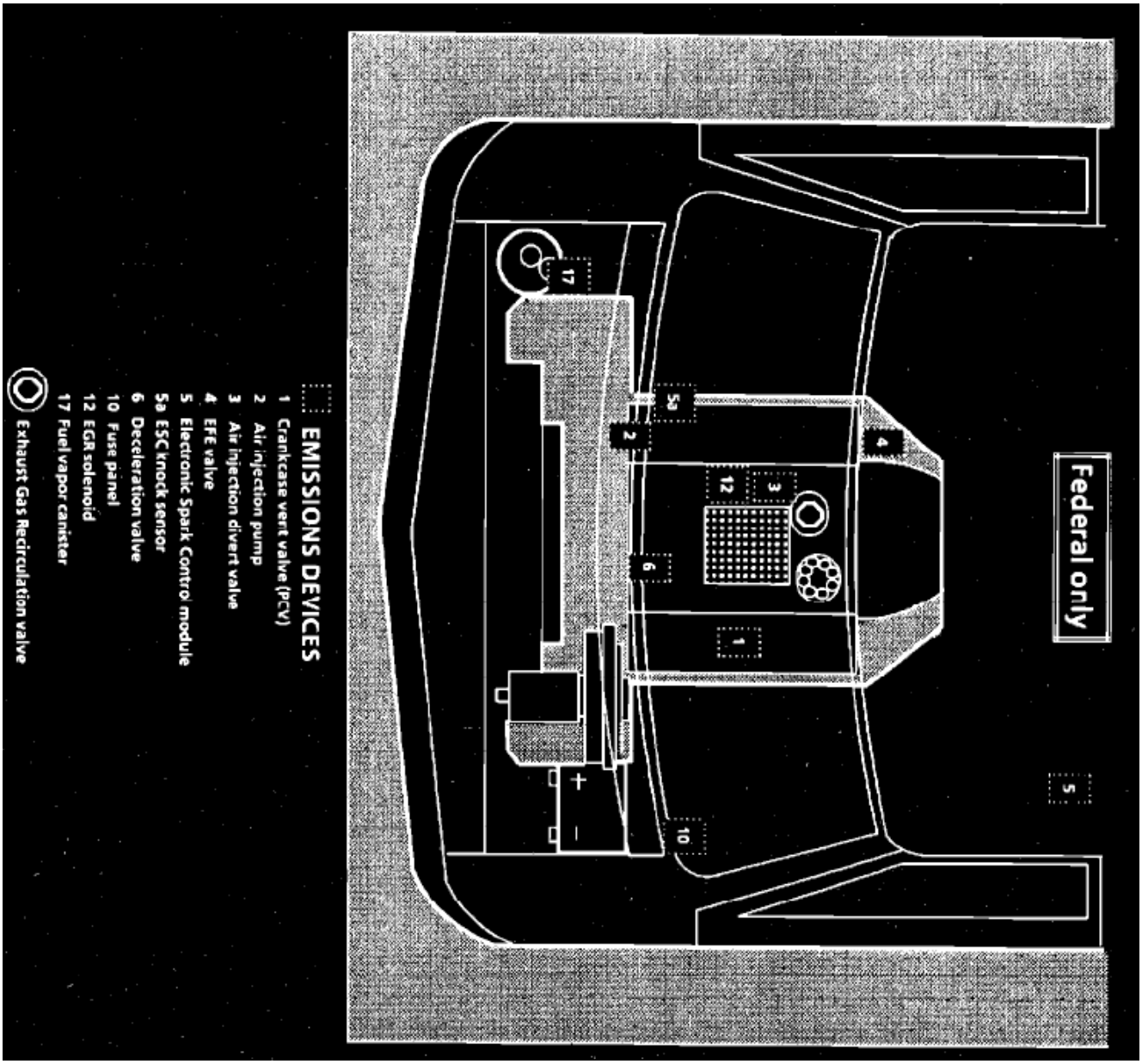
California

Underhood & Engine Components.

RH Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

Except California

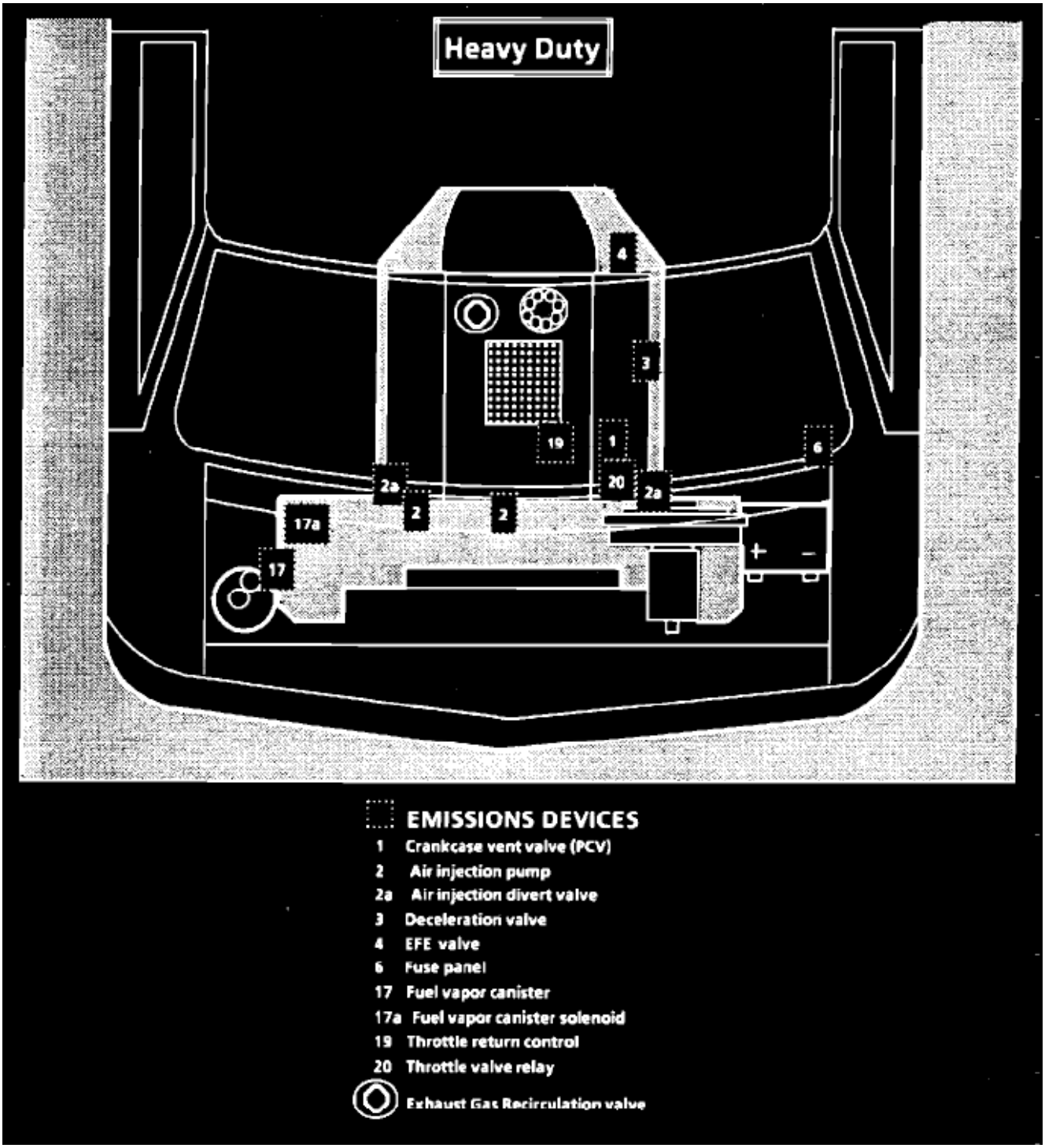


Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

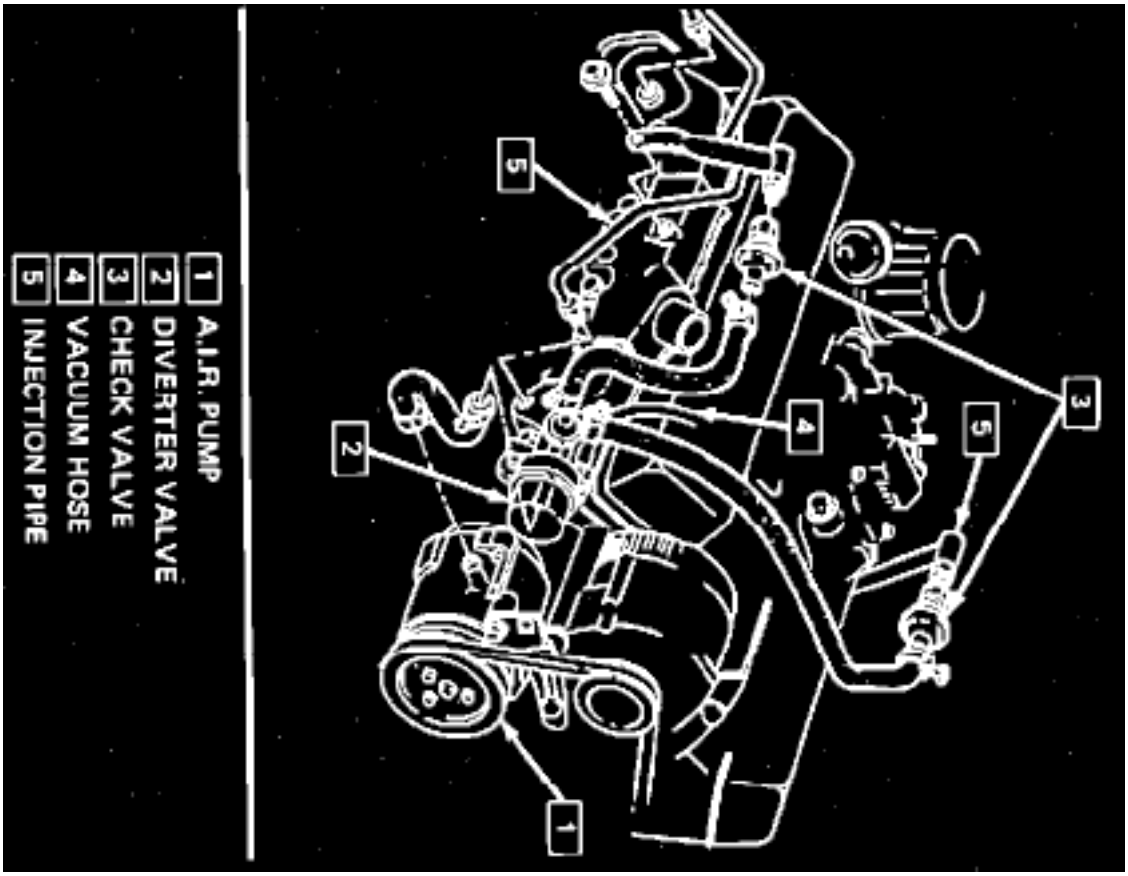
Heavy Duty Emissions



Underhood & Engine Components

RH & LH Sides Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions



Electric Air Control Valve: Locations Diverter Valve

Top Of Engine.

On Lower RH Side Of Engine

Applicable to: 1985 V8 & Heavy Duty Emissions

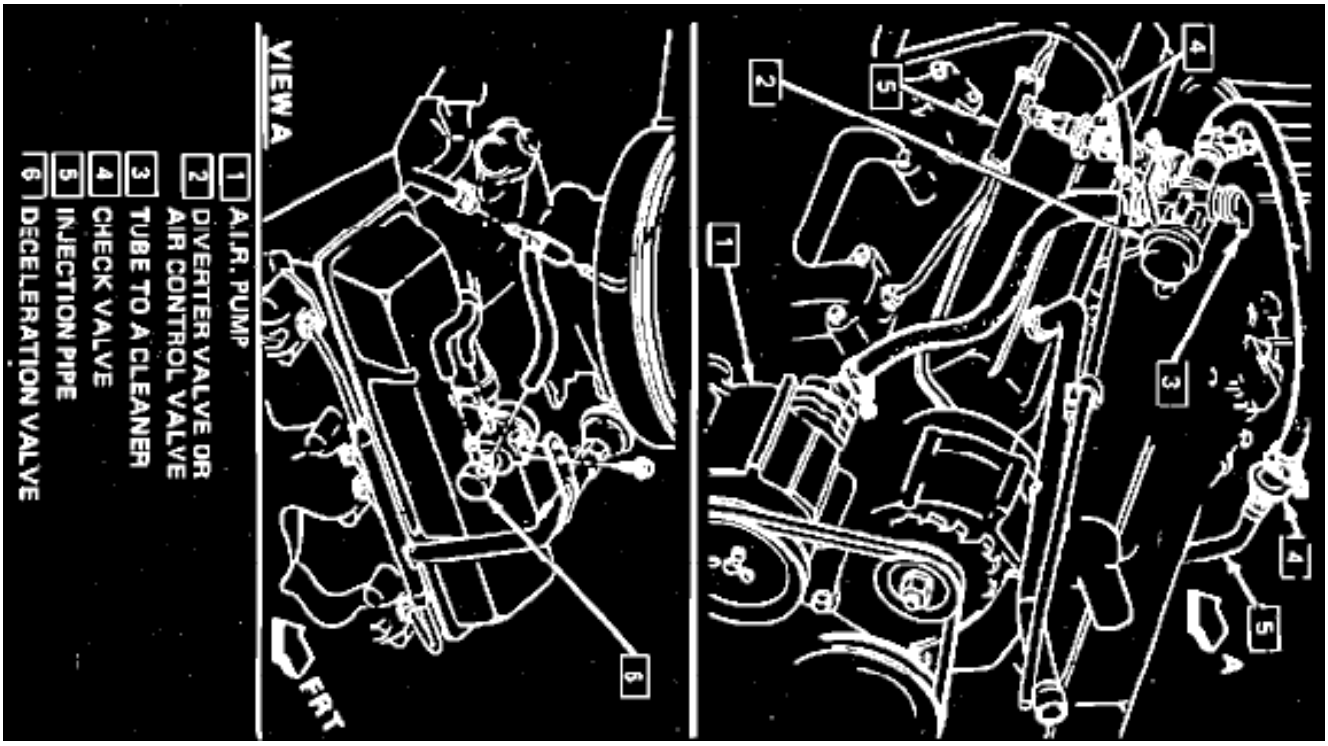
Electric Air Control Valve: Description and Operation

This system helps reduce hydrocarbon (HC) and carbon monoxide (CO) exhaust emissions. It also heats the catalyst and oxygen sensor quickly during engine warm-up. This is accomplished by injecting air into the exhaust port or catalytic converter.

When the ECM energizes the air control valve, air is allowed to flow to the air switching valve. The air switching valve then directs this air to the exhaust port.

During warm engine operation (closed loop), the ECM deenergizes the air control valve. This causes the air switching valve to direct air to the catalytic converter.

If the air control valve detects a rapid increase in manifold vacuum (deceleration condition), or ECM detects any failure in the CCC system, air is diverted to the air cleaner or is dumped to the atmosphere.

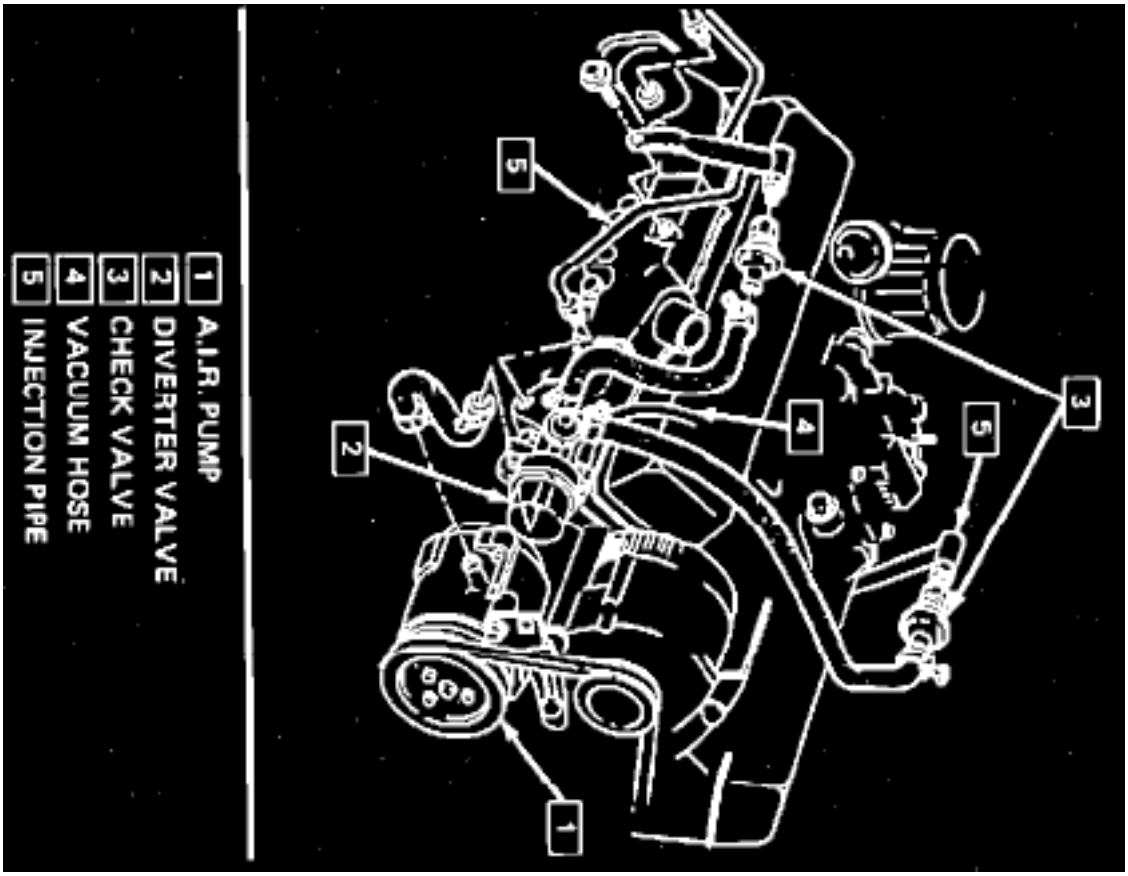


Air Injection Hose/Tube: Locations Light Duty Emissions

LH & RH Sides Of Engine.

On RH & LH Sides Of Engine

Applicable to: 1985 V8 & Light Duty Emissions

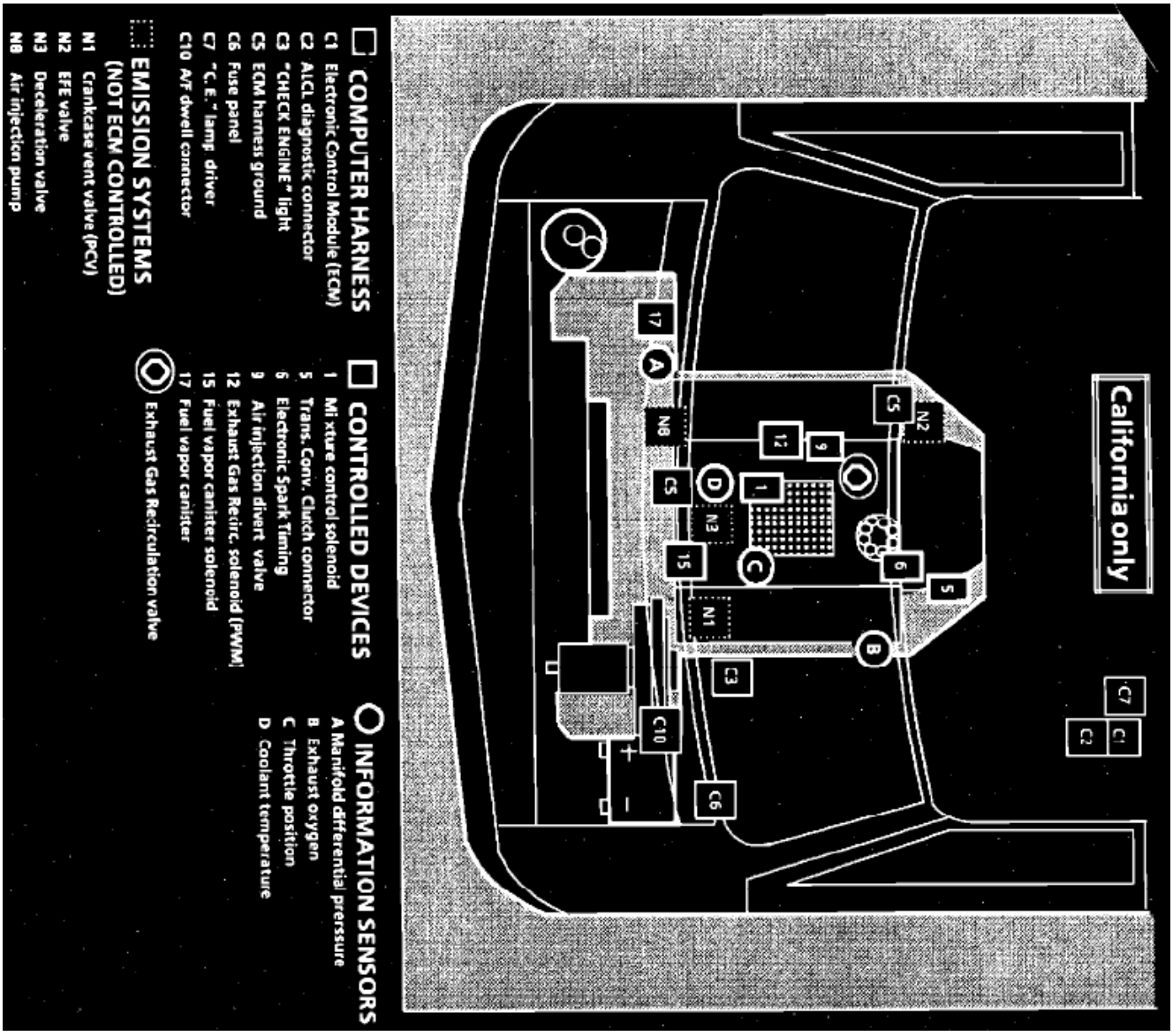


Air Injection Hose/Tube: Locations Heavy Duty Emissions

Top Of Engine.

On RH & LH Sides Of Engine

Applicable to: 1985 V8 & Heavy Duty Emissions



Air Injection Pump: Locations Air Injection Pump

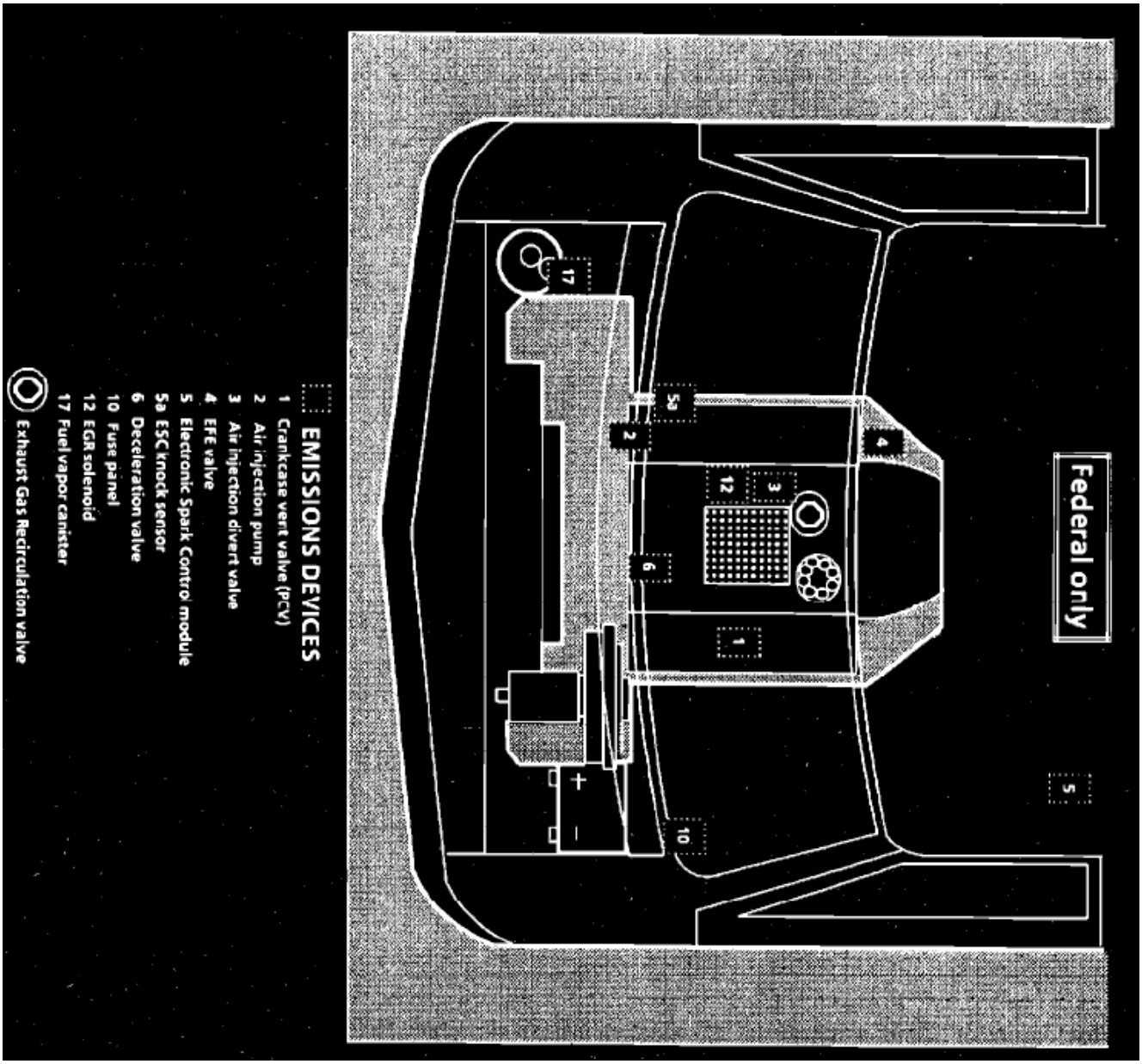
California

Underhood & Engine Components.

RH Side Front Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

Except California

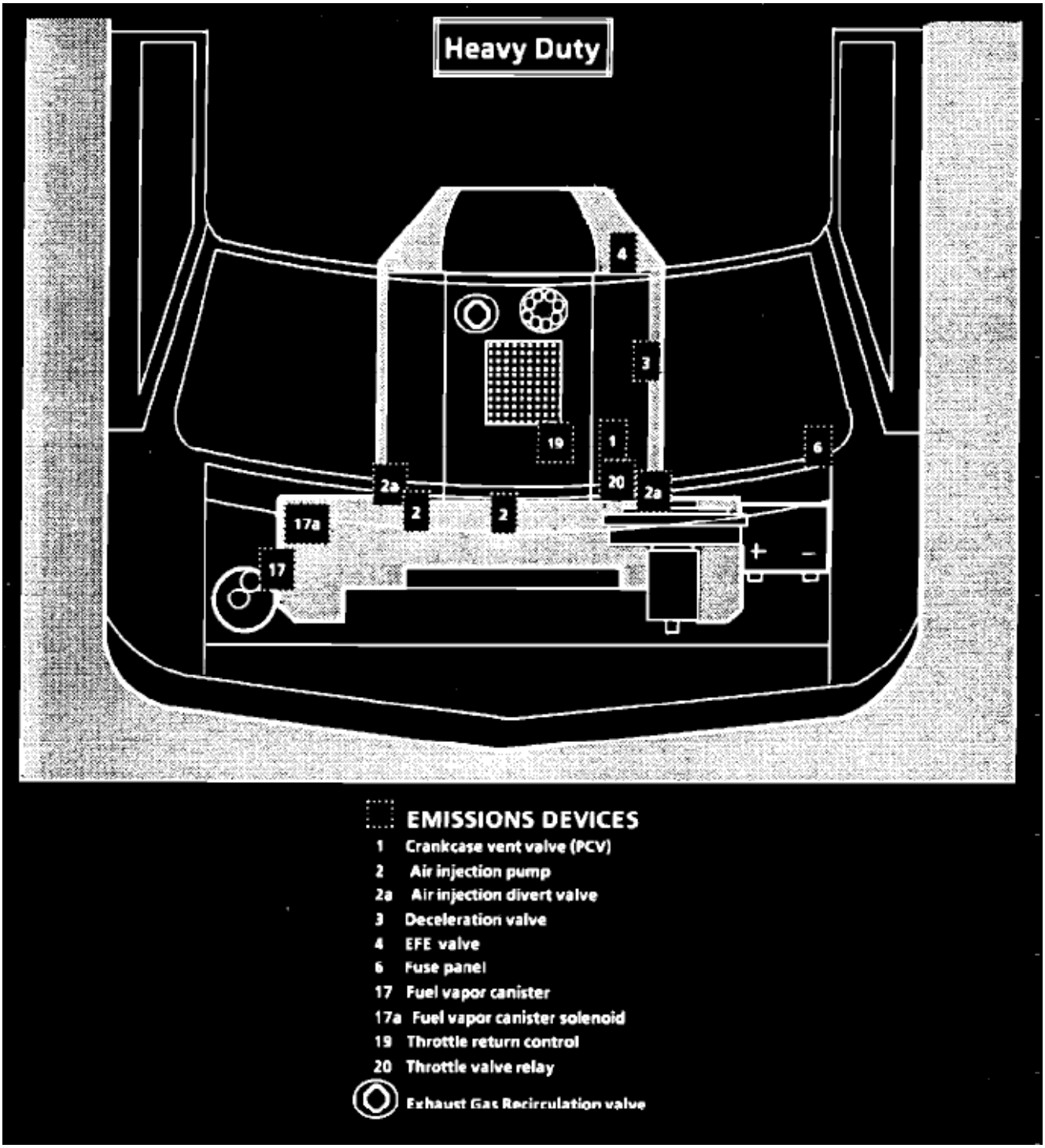


Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

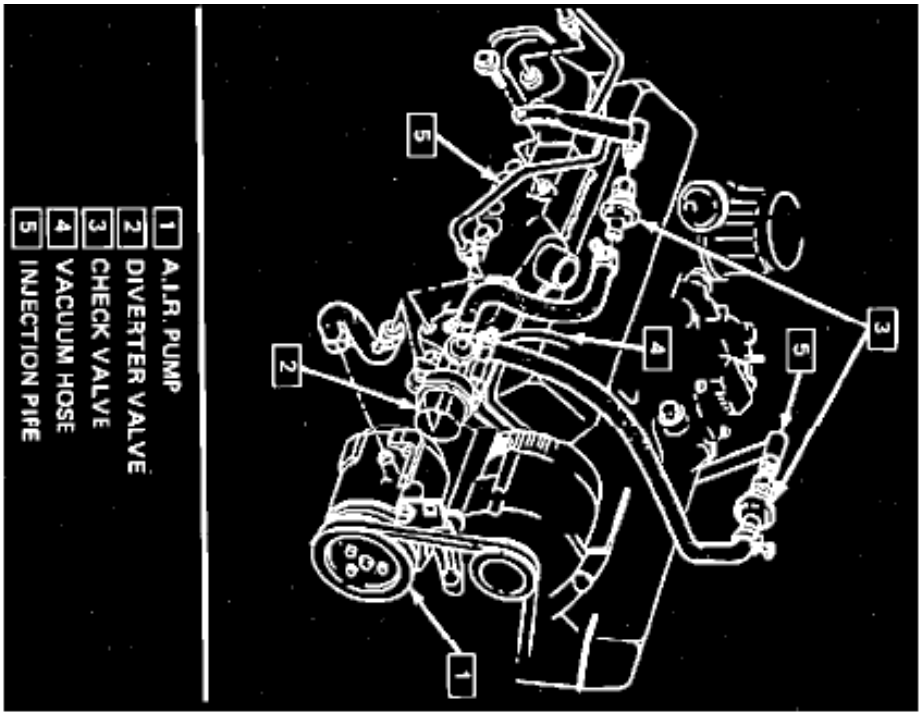
Heavy Duty Emissions

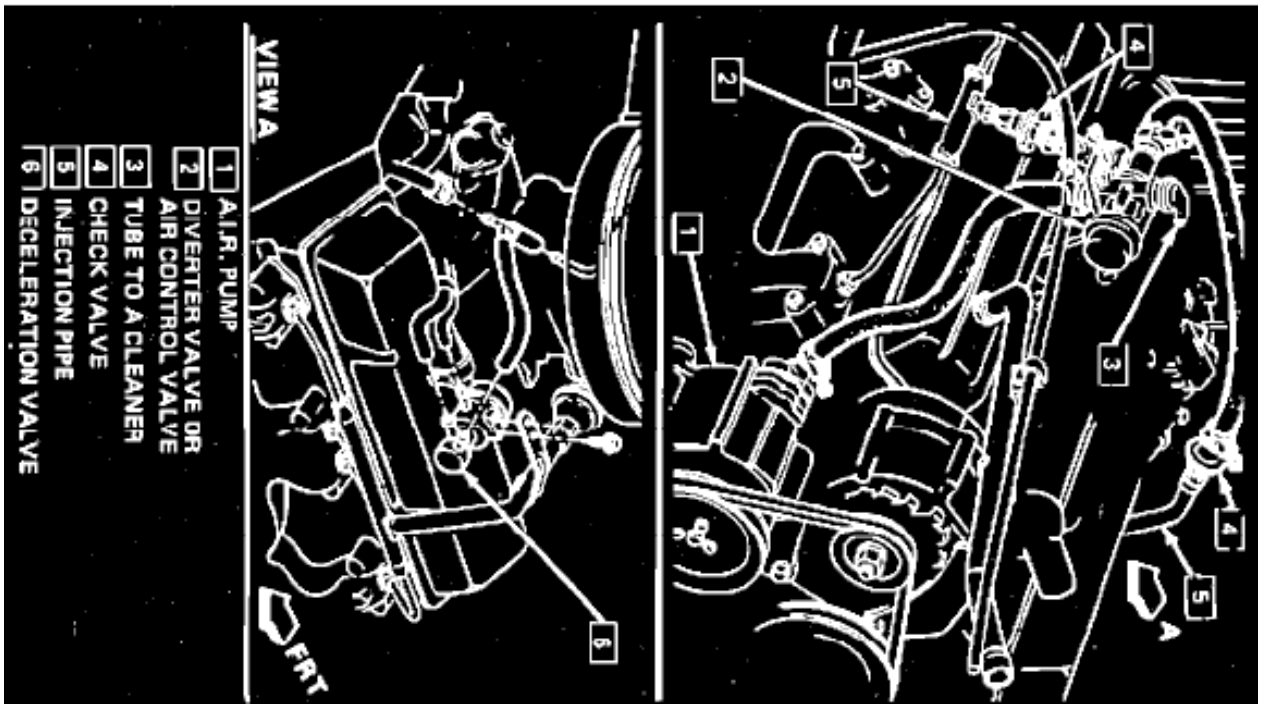


Underhood & Engine Components

RH & LH Sides Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions


1 A.I.R. PUMP
2 DIVERTER VALVE
3 CHECK VALVE
4 VACUUM HOSE
5 INJECTION PIPE


VIEW A
1 A.I.R. PUMP
2 DIVERTER VALVE OR AIR CONTROL VALVE
3 TUBE TO A CLEANER
4 CHECK VALVE
5 INJECTION PIPE
6 DECELERATION VALVE
FRT

Air Injection Pump: Locations Air Pump

Heavy Duty Emissions

Top Of Engine.

On Lower RH Side Of Engine

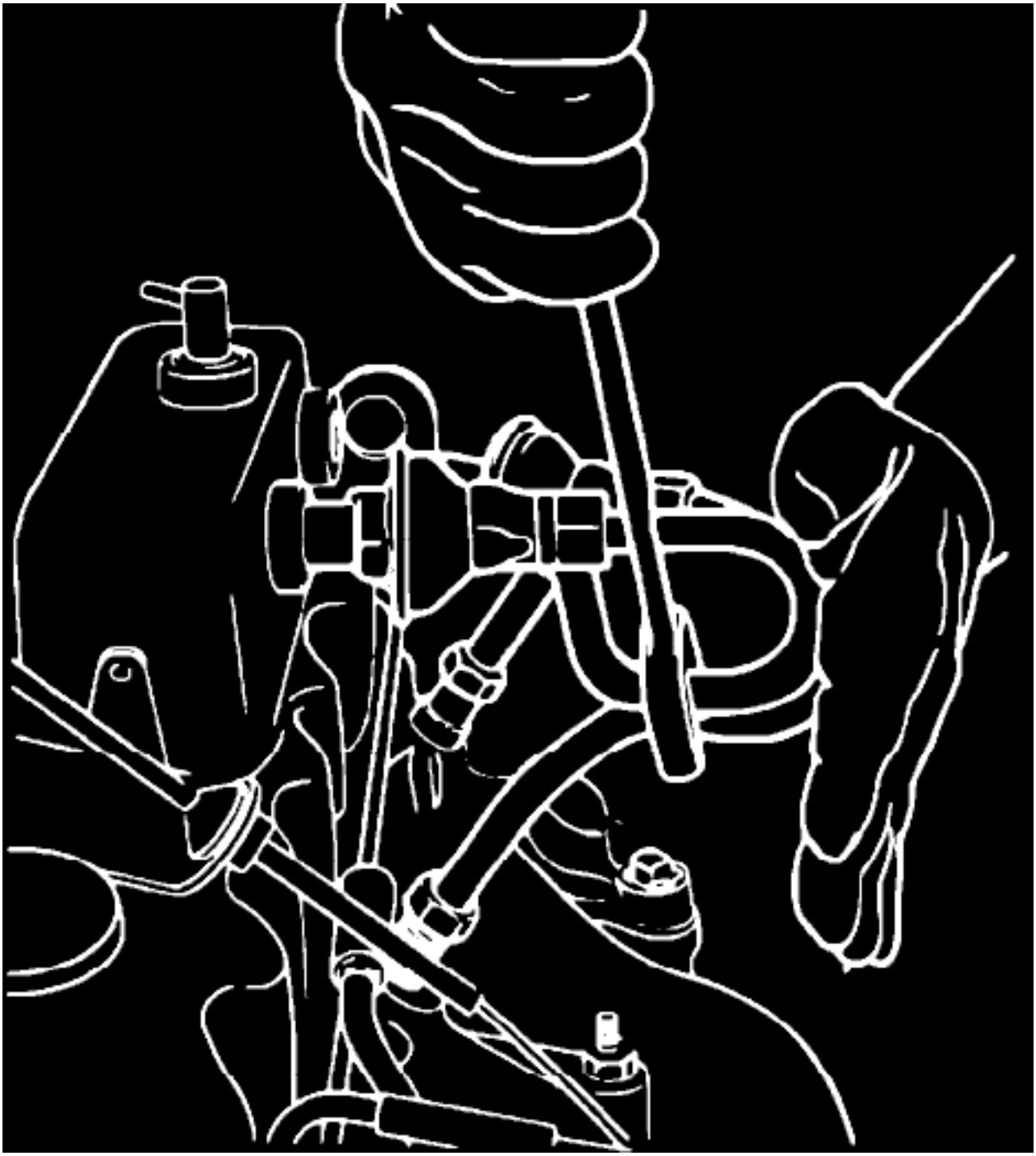
Applicable to: 1985 V8 & Heavy Duty Emissions

Light Duty Emissions

LH & RH Sides Of Engine.

Lower RH Side Of Engine

Applicable to: 1985 V8 & Light Duty Emissions



Pulsair Valve: Service and Repair

Fig. 81 PAIR injection tube removal

PULSE AIR VALVE, REPLACE

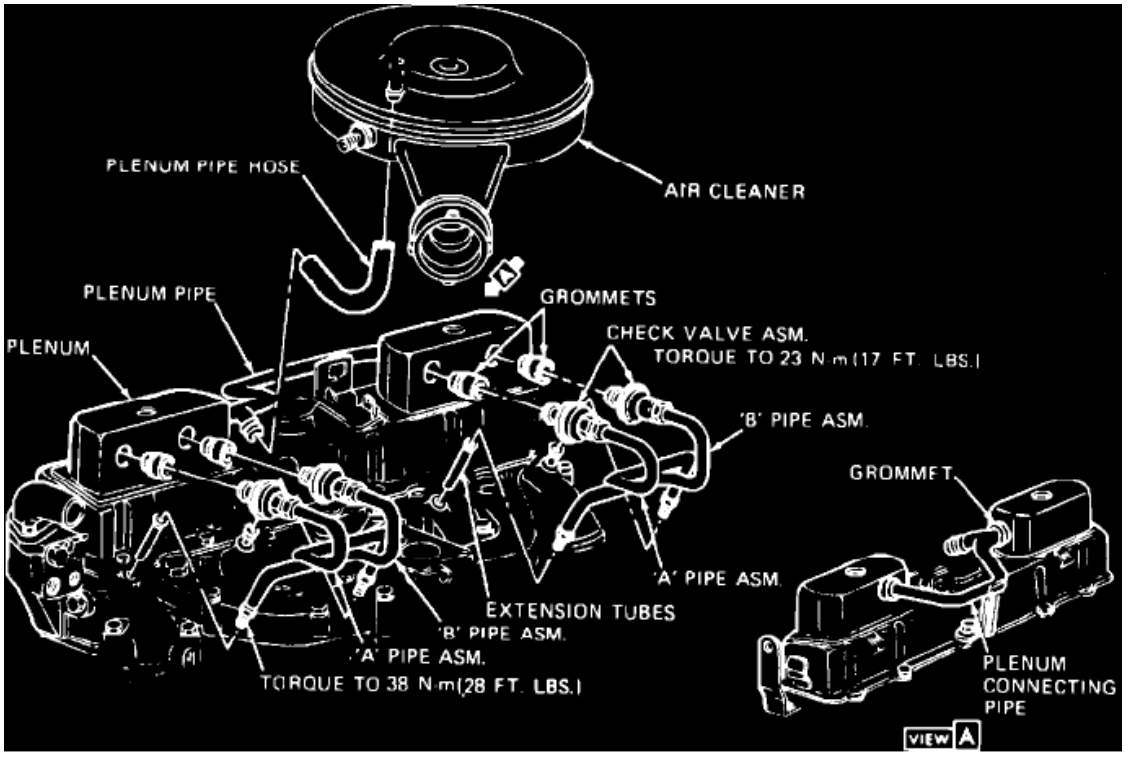
1. Remove air cleaner, then disconnect rubber hose from plenum connecting pipe.

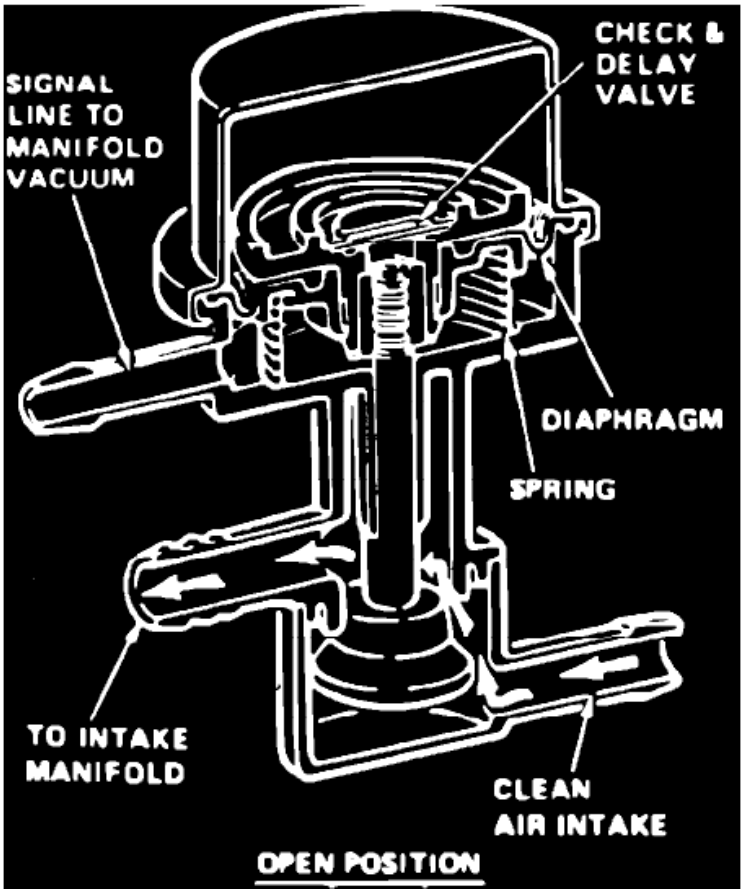
2. Disconnect four pipe check valve fittings from cylinder head and remove check valve pipes from plenum grommets.

3. Assemble replacement valves to pipe, then install pipe check valve assemblies to cylinder head and finger tighten fittings.

4. Using a suitable tool as a lever, align check valve to plenum grommet and install valve into grommet, Fig. 81. To ease assembly, apply a suitable rubber lubricant to grommets.

5. Torque fittings to specified torque, then reinstall air cleaner and hose.


PLENUM PIPE HOSE
AIR CLEANER
PLENUM PIPE
GROMMETS
PLENUM
CHECK VALVE ASM.
TORQUE TO 23 N·m(17 FT. LBS.)
'B' PIPE ASM.
GROMMET
'A' PIPE ASM.
EXTENSION TUBES
'B' PIPE ASM.
'A' PIPE ASM.
TORQUE TO 38 N·m(28 FT. LBS.)
PLENUM CONNECTING PIPE
VIEW A


SIGNAL LINE TO MANIFOLD VACUUM
CHECK & DELAY VALVE
DIAPHRAGM
SPRING
TO INTAKE MANIFOLD
CLEAN AIR INTAKE
OPEN POSITION

Pulsed Secondary Air Injection: Description and Operation

Fig. 79 Pulse Air Injection Reaction (PAIR) installation

Fig. 80 Deceleration valve

The PAIR system, Fig. 79, is used on some vehicles and consists of pulse air check valves which are connected by tubes to the exhaust ports. As the engine fires, a pressure, either positive or negative, is created. When the pulse air valve receives a negative pressure, fresh air flows into the exhaust system. A positive pressure will force the check valve closed, stopping exhaust gas flow past the valve and into the fresh air supply line. A deceleration valve, Fig. 80, used on some engines, prevents backfiring in the exhaust system during deceleration. When deceleration causes an abrupt vacuum increase in the vacuum signal line, the pressure differential on the diaphragm overcomes spring tension, opening the valve and bleeding air into the intake manifold. Air trapped in the chamber above the vacuum diaphragm will be bled at a calibrated rate through the delay valve portion of the integral check and delay valve, reducing vacuum on the diaphragm. When vacuum on the diaphragm and spring tension become equal, the valve closes and cuts off air supply to the intake manifold. The check valve portion of the check and delay valve provides a rapid balancing of chamber pressure when there is a sudden decrease in vacuum during acceleration.

Pulsed Secondary Air Injection: Testing and Inspection

1. If a pulse air valve emits a hissing noise, the valve may be defective or improperly torqued. Inspect valve and make necessary repairs.

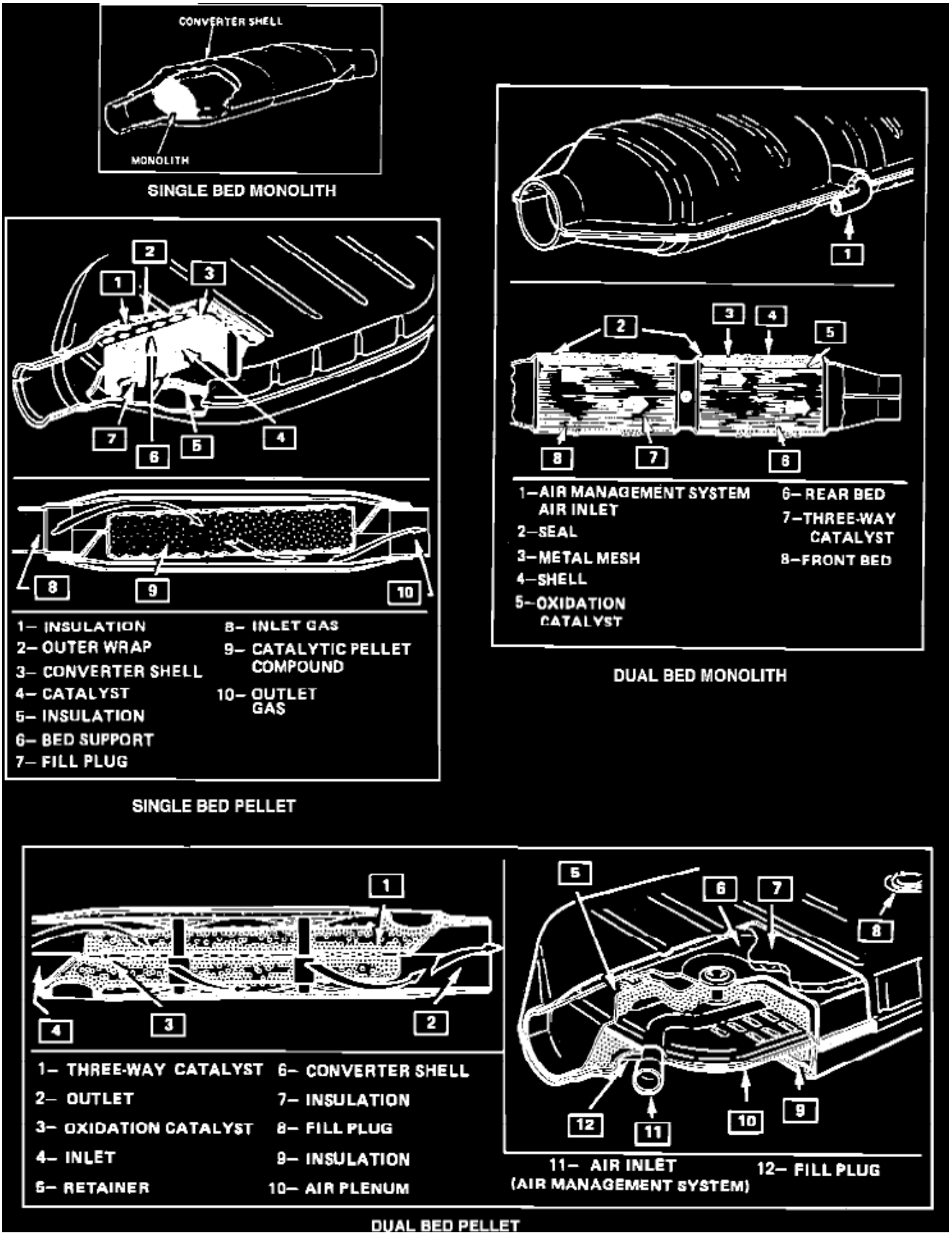
2. If one or more valves fail, exhaust gas will enter the carburetor through the air cleaner, resulting in poor driveability. Inspect valves and ensure that pulse air pipe extension tubes are installed in exhaust manifold.

3. Exhaust gases passing through the pulse air valve will transmit excessive heat to rocker cover plenum, indicated by burned off paint. This condition will also cause the deterioration of rubber grommets and hoses. Repair or replace parts as necessary.

4. If hose leading to air cleaner deteriorates, particles may enter carburetor and cause poor driveability. Clean carburetor and remove particles from pulse air plenums and connecting pipe.

5. To test air valves for proper operation, connect adapter tool J-23738 with a length of 3/4 inch hose to grommet end of valve to create a vacuum. Apply 15 inches Hg to valve. If vacuum drops to 6 inches Hg in less than two seconds, replace valve.

Refer to ``Catalytic Converters'' for ``Exhaust System Restriction Check.''


CONVERTER SHELL
MONOLITH
SINGLE BED MONOLITH
1
2
3
4
5
6
7
8
9
10
1– INSULATION
2– OUTER WRAP
3– CONVERTER SHELL
4– CATALYST
5– INSULATION
6– BED SUPPORT
7– FILL PLUG
8– INLET GAS
9– CATALYTIC PELLET COMPOUND
10– OUTLET GAS
SINGLE BED PELLET
1–AIR MANAGEMENT SYSTEM AIR INLET
2–SEAL
3–METAL MESH
4–SHELL
5–OXIDATION CATALYST
6–REAR BED
7–THREE-WAY CATALYST
8–FRONT BED
DUAL BED MONOLITH
1– THREE-WAY CATALYST
2– OUTLET
3– OXIDATION CATALYST
4– INLET
5– RETAINER
6– CONVERTER SHELL
7– INSULATION
8– FILL PLUG
9– INSULATION
10– AIR PLENUM
11– AIR INLET (AIR MANAGEMENT SYSTEM)
12– FILL PLUG
DUAL BED PELLET

Catalytic Converter: Description and Operation

Catalytic Converters

DESCRIPTION

The catalytic converter is an emission control device added to the exhaust system to effectively reduce the levels of carbon monoxide, hydrocarbons, and in some cases oxides of nitrogen, entering the atmosphere.

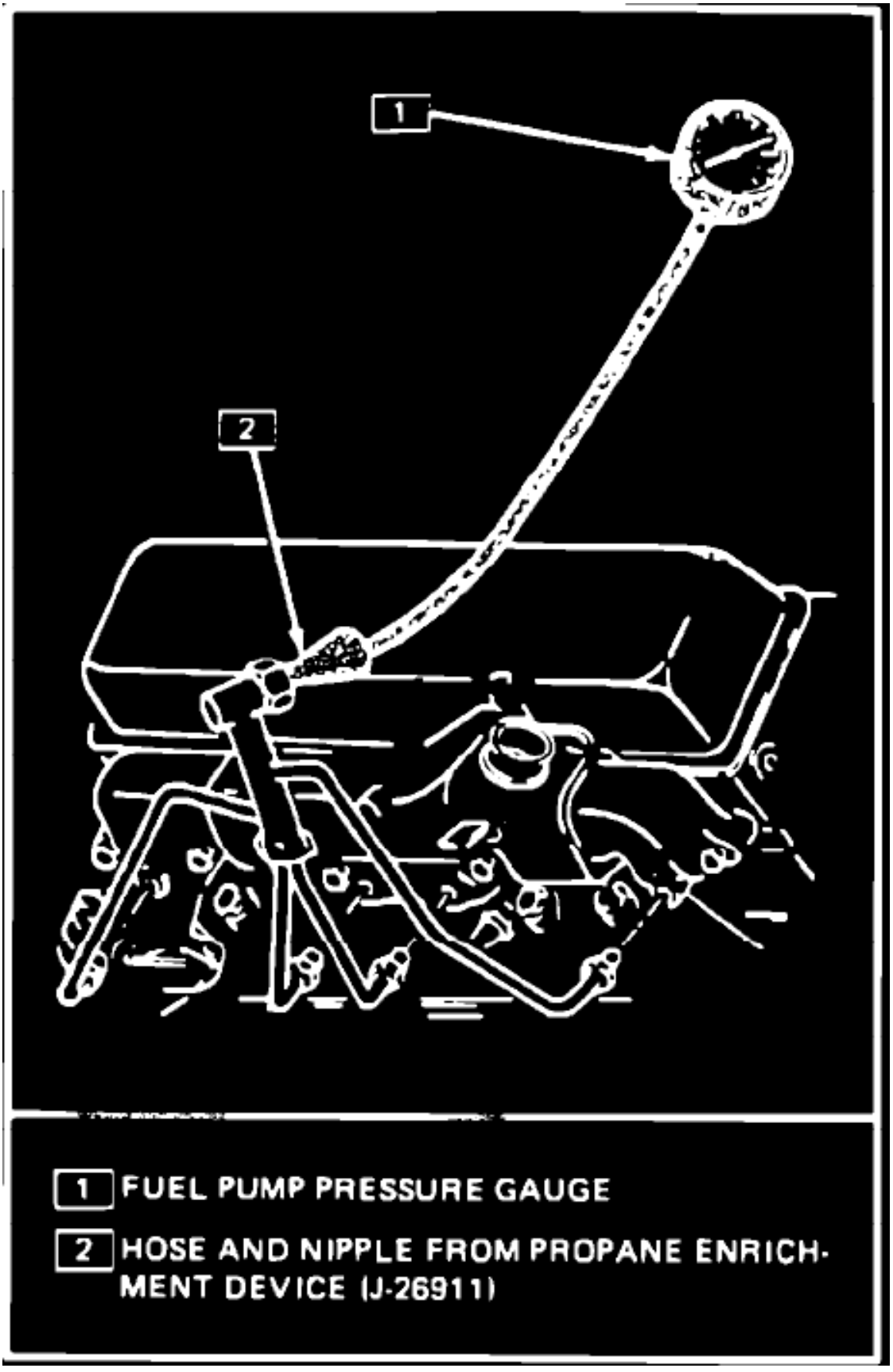
The converter serves two purposes: it permits a faster chemical reaction to take place and although it enters into the chemical reaction, it remains unchanged, ready to repeat the process.

This device sometimes requires the use of heat shields, due to its high operating temperatures. The heat shields are necessary to protect chassis components, passenger compartment and other areas from heat related damage.

General Motors uses four different converter designs in conjunction with two types of catalysts. The four converter designs are: single bed monolith, dual bed monolith, single bed pellet and dual bed pellet. The two types of catalysts used are an oxidation catalyst and a three way (reduction) catalyst.

The oxidation catalyst is coated with material containing platinum and palladium which lowers levels of carbon monoxide and hydrocarbons. The three way (reduction) catalyst is coated with platinum and rhodium which lowers levels of oxides of nitrogen (NOx), as well as carbon monoxide and hydrocarbons. All dual bed converters, whether monolith or pellet type, contain both oxidation and three way catalysts.

A small diameter fuel tank filler tube is used on catalytic converter equipped vehicles to prevent the larger service station pump nozzle, used for leaded fuels, being inserted into the filler tube. Since the use of leaded fuels contaminates the catalyst, rendering them ineffective, the use of unleaded fuels is mandatory in catalytic converter equipped vehicles.


1
2
1 FUEL PUMP PRESSURE GAUGE
2 HOSE AND NIPPLE FROM PROPANE ENRICHMENT DEVICE (J-26911)

Catalytic Converter: Testing and Inspection

Fig. 32 Typical exhaust system restriction check. Models w/air injection

EXHAUST SYSTEM RESTRICTION CHECK

MODELS W/AIR INJECTION

1. Run engine until it reaches normal operating temperature, then stop engine.

2. Disconnect and remove check valve from air injection tube or manifold.

3. Connect suitable pressure gauge to nipple from propane enrichment tool J-26911 or equivalent, then insert nipple into injection tube opening, Fig. 32.

4. Start engine and run at 2500 RPM while observing gauge.

5. If gauge reading exceeds 2-3/4 psi, inspect entire exhaust system for collapsed pipes, heat distress or possible internal muffler failure.

6. If all other components are satisfactory, replace catalytic converter.

MODELS LESS AIR INJECTION

1. Run engine until it reaches normal operating temperature, then stop engine.

2. Connect suitable vacuum gauge to any convenient port to direct intake manifold vacuum.

3. Disconnect EGR solenoid electrical connector, if equipped, or reroute hoses as needed to connect EGR valve directly to vacuum source, bypassing any switches or solenoids.

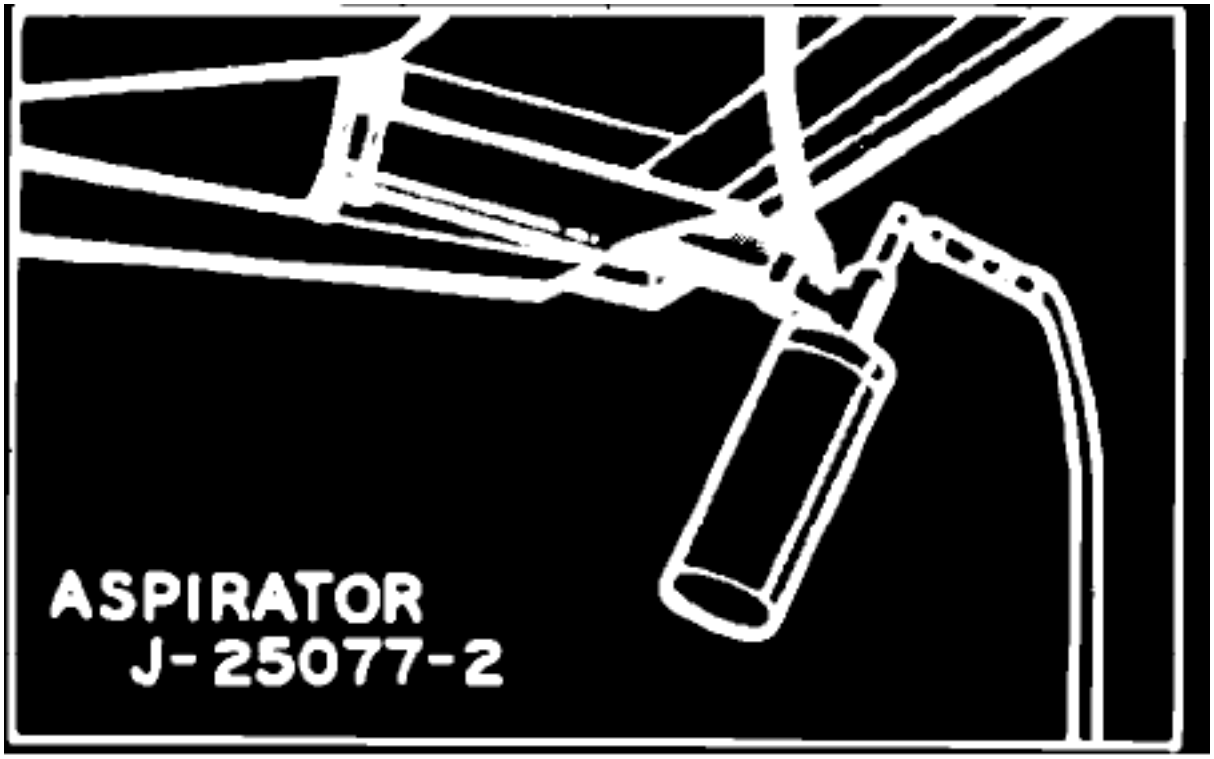
4. Run engine at 1000 RPM and record vacuum reading.

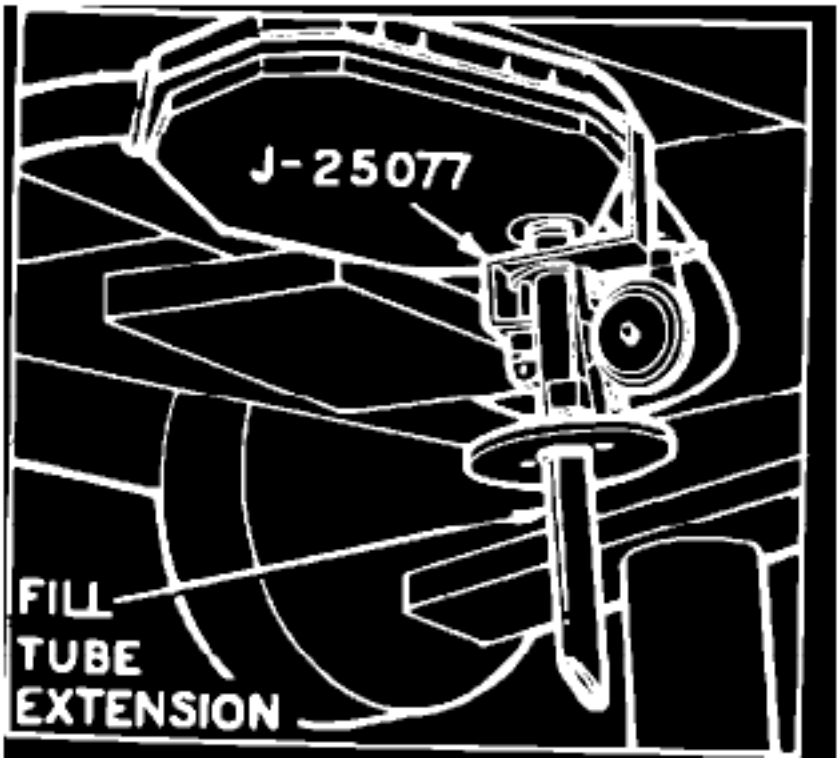
5. Slowly increase engine speed to 2500 RPM and record vacuum reading at a steady 2500 RPM.

6. If vacuum reading at 2500 RPM decreases more than 3 inches Hg from reading at 1000 RPM, check for exhaust restrictions as outlined for models with air injection.

7. If no restrictions are found, repeat check with exhaust pipe(s) disconnected from manifold(s).

8. If vacuum readings still differ by more than 3 inches Hg, check valve timing. On models without air injection or EGR, connect suitable vacuum gauge to intake manifold vacuum, and observe gauge with engine idling at normal operating temperature. If gauge reading regularly drops to zero, check exhaust system for restrictions and repair as needed.


ASPIRATOR
J-25077-2


J-25077
FILL
TUBE
EXTENSION

Catalytic Converter: Service and Repair

Fig. 33 Aspirator installation

Fig. 34 Vibrator installation

CATALYST REMOVAL Monolith type converters are not serviceable. The following procedure applies only to pellet type catalytic converters.

1. Raise and support vehicle.

2. Install aspirator, Fig. 33, and connect an air line to aspirator, creating a vacuum in the converter, thereby holding pellets in place when fill plug is removed.

3. If converter is equipped with threaded fill plug, use a 3/4 inch Allen wrench and remove fill plug from converter.

4. If converter is equipped with pressed fill plug, lightly drive a small chisel between converter shell and fill plug until fill plug distorts. Remove fill plug with pliers. Do not pry fill plug from converter, since damage to fill plug sealing surface may result.

5. Install vibrator and catalyst container, then adapter J-25077, if equipped with pressed fill plug, Fig. 34.

6. Disconnect air line from aspirator and connect to vibrator. Catalyst will now drain from converter.

7. When all catalyst has been drained from converter, remove container and discard the used catalyst.

CATALYST INSTALLATION

1. Fill container with recommended replacement catalyst and install fill tube extension to fixture.

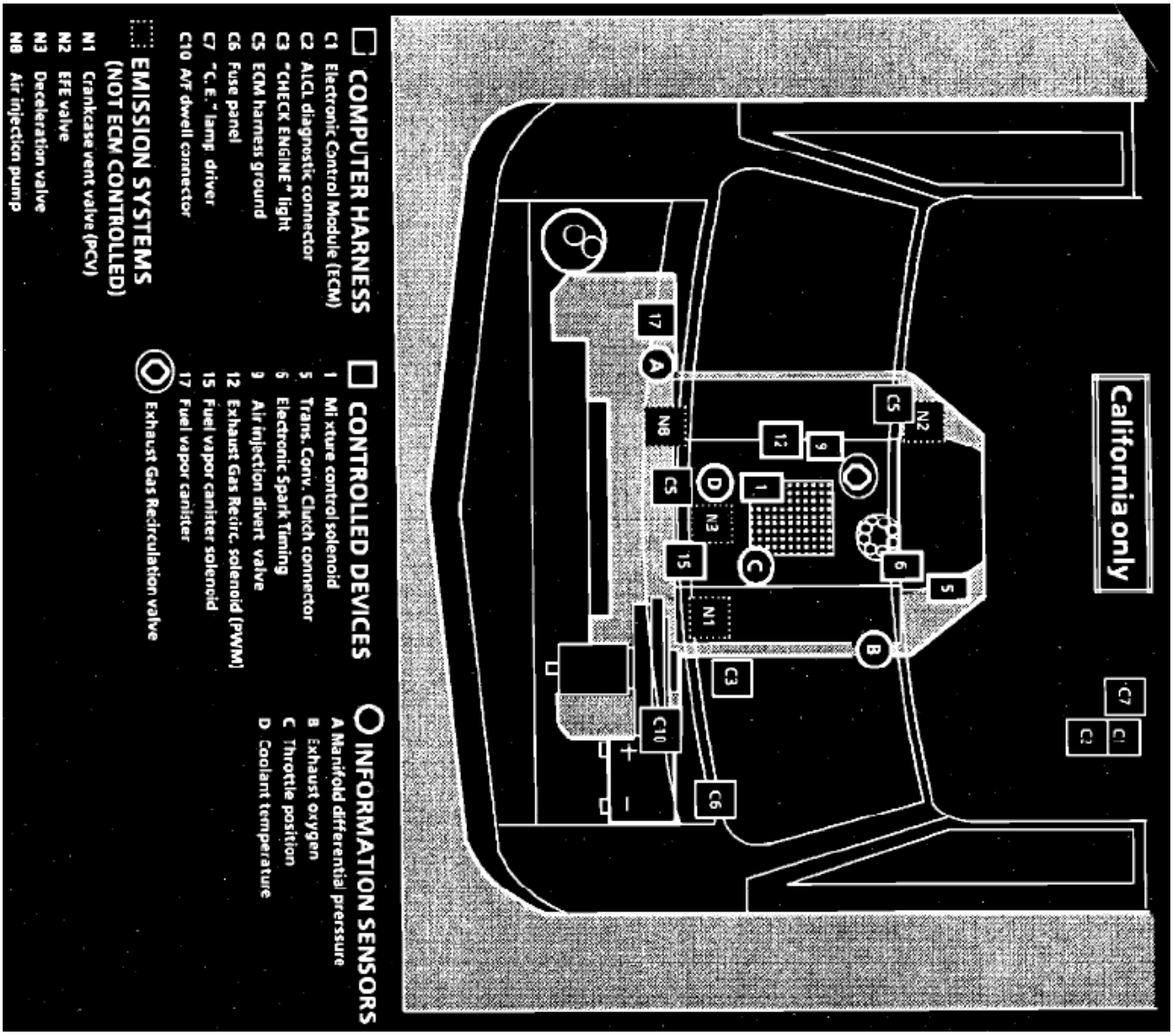
2. Connect air line to aspirator and vibrator, then secure container to fixture.

3. When catalyst stops flowing, disconnect air line from vibrator making sure catalyst has filled converter flush with fill plug. Add catalyst, if necessary.

4. If equipped with threaded fill plug, apply suitable anti-seize compound to threads and install into converter. Torque fill plug to 50-60 ft. lbs.

5. If equipped with pressed fill plug, install service fill plug kit with dished fill plug facing outward.

6. Disconnect air supply from aspirator, then remove aspirator from converter.

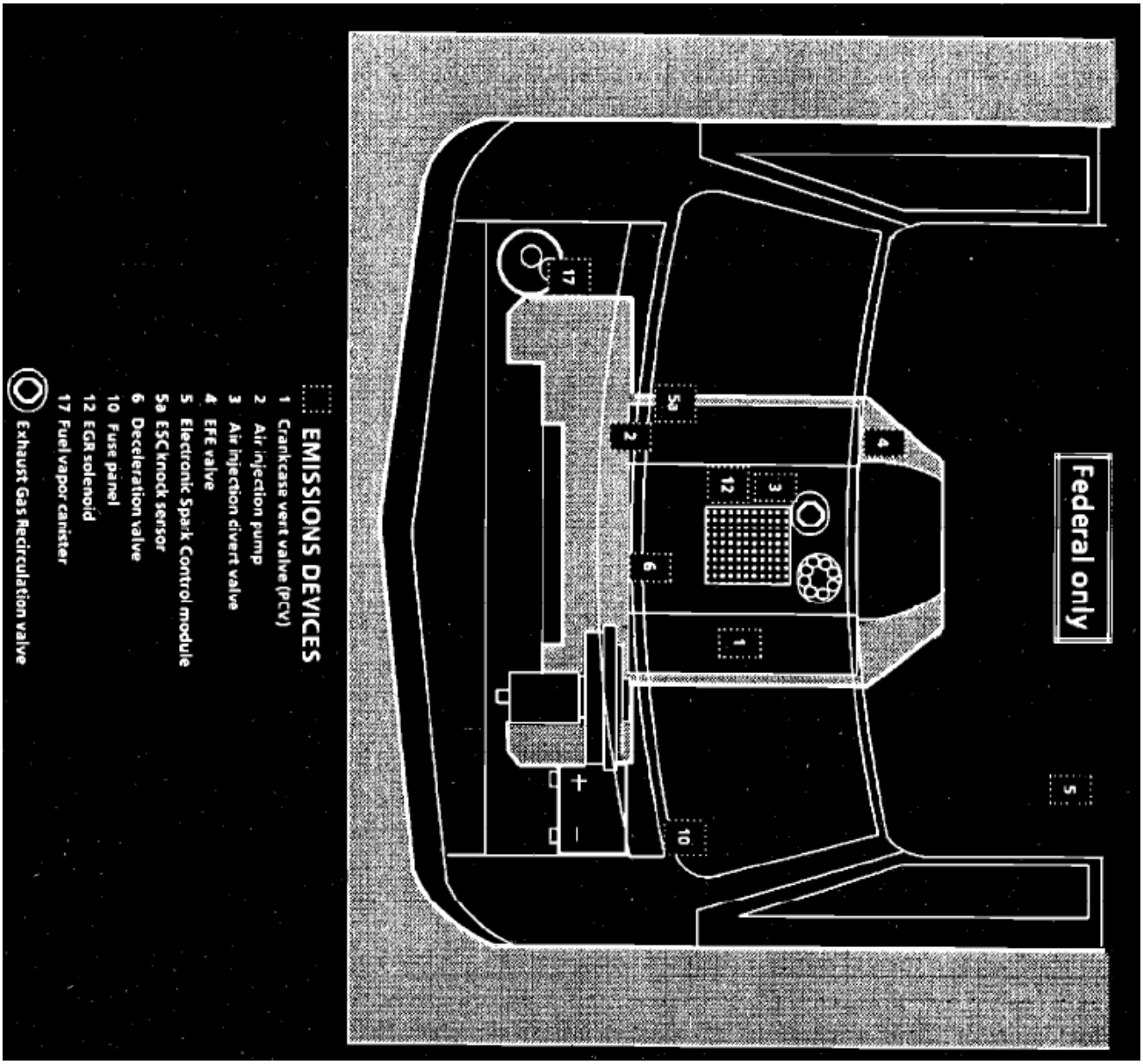


Deceleration Valve: Locations California

Underhood & Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

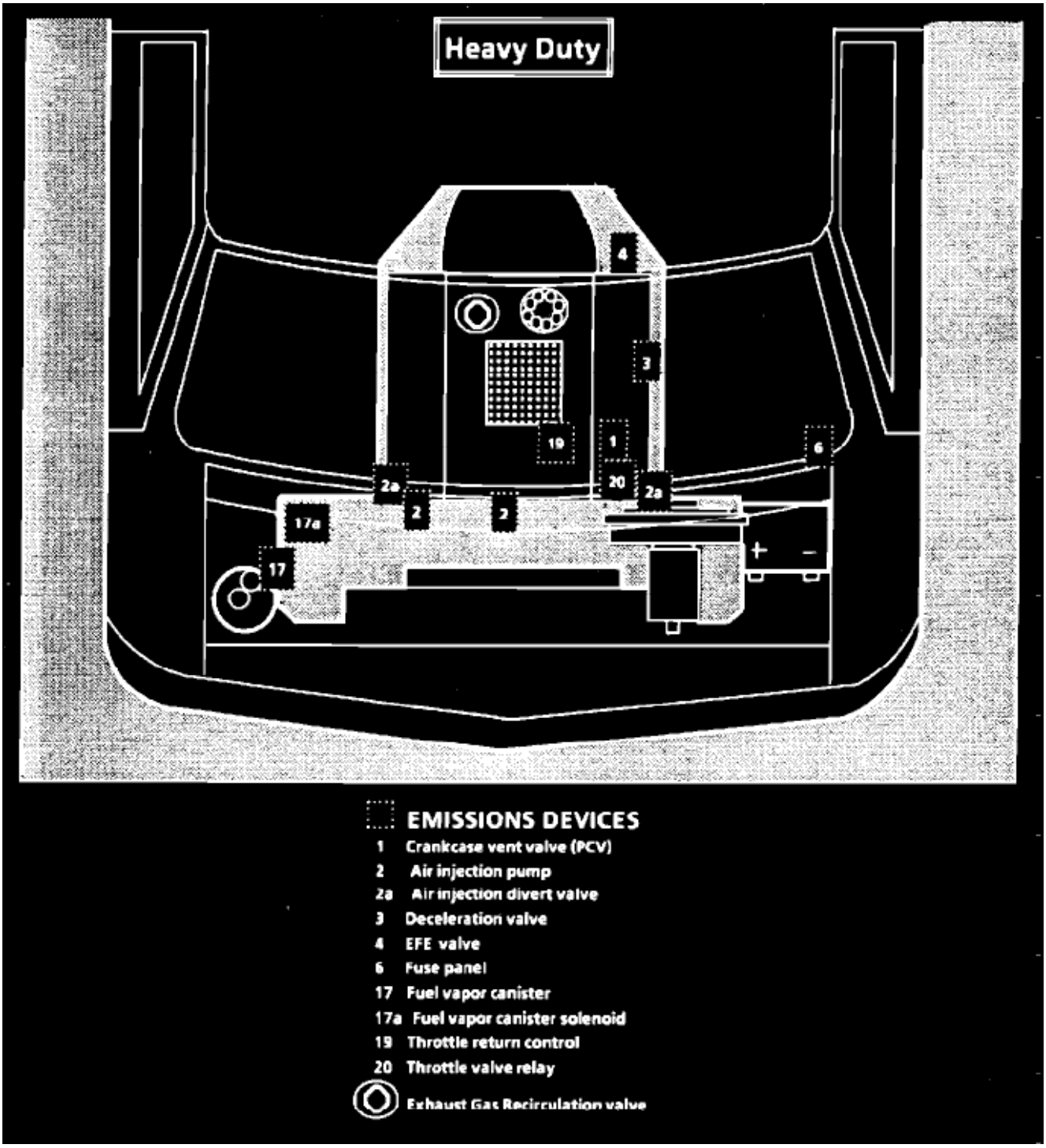


Deceleration Valve: Locations Except California

Underhood & Engine Components.

Top Front Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

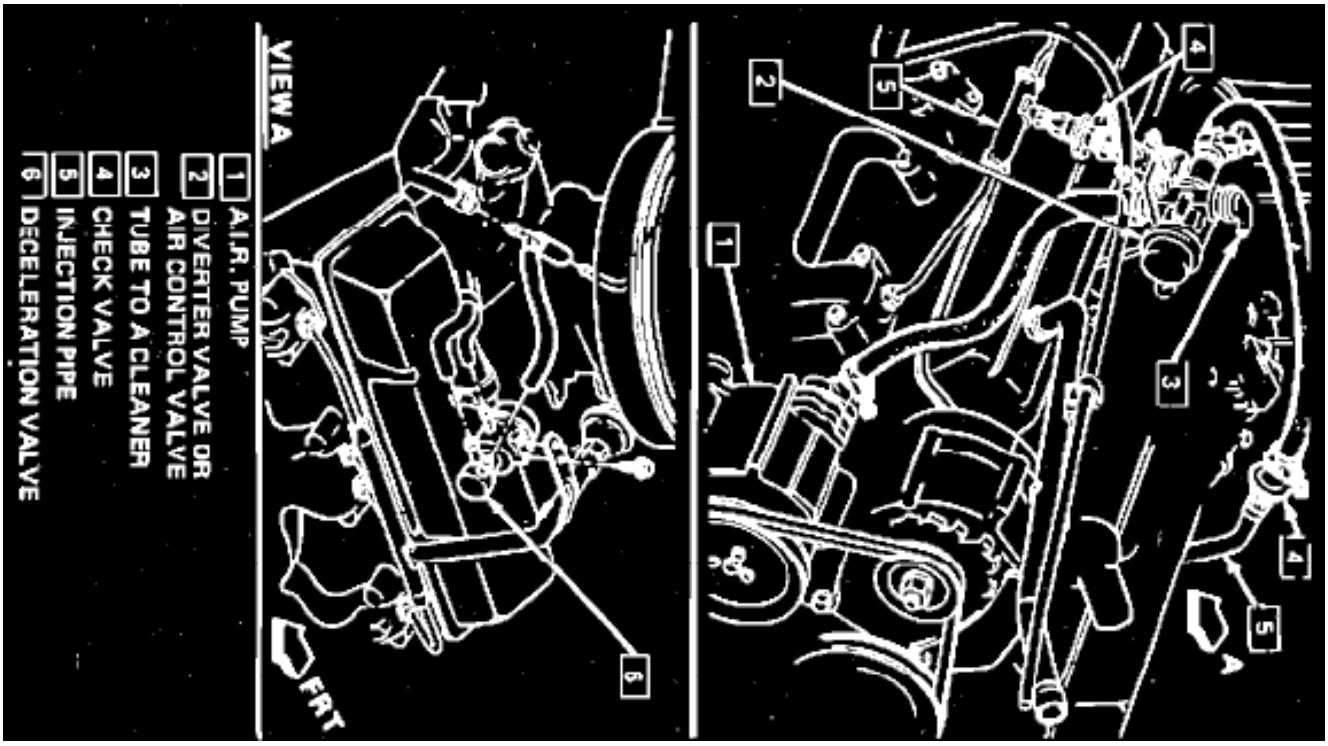


Deceleration Valve: Locations Heavy Duty Emissions

Underhood & Engine Components

LH Side Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

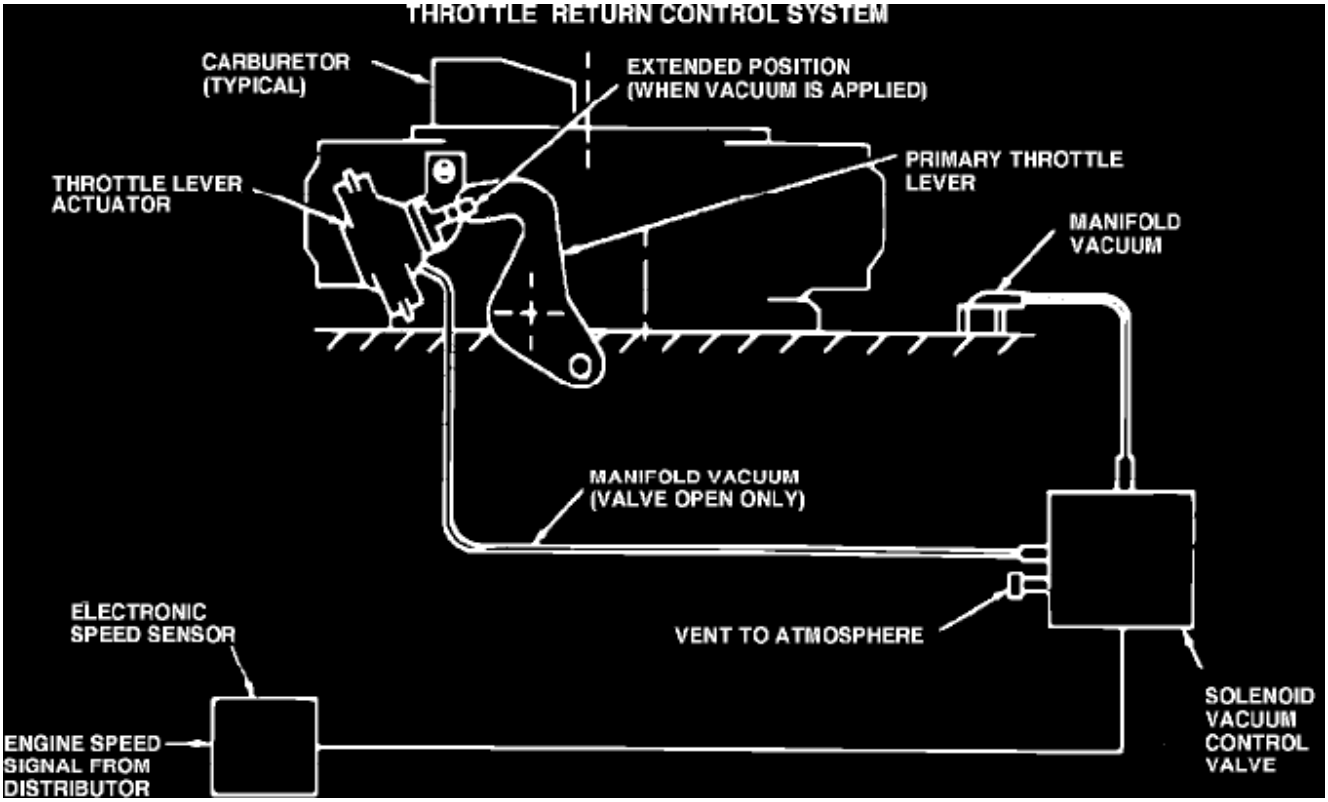


Deceleration Valve: Locations Light Duty Emissions

LH & RH Sides Of Engine.

On LH Side Top Of Engine

Applicable to: 1985 V8 & Light Duty Emissions



Deceleration Valve: Description and Operation

Fig. 86 Throttle Return Control (TRC) system schematic

This system, Fig. 86, is used on some vehicles. During coasting, the control valve opens to allow vacuum to operate the throttle lever actuator. The throttle actuator lever holds the throttle valve slightly open, thereby allowing more air to enter the combustion chambers to lean out the over-rich mixture and reduce hydrocarbon emissions. When manifold vacuum drops below a predetermined value, the control valve closes, allowing the throttle actuator to return the throttle valve to normal idle.

Deceleration Valve: Testing and Inspection

THROTTLE LEVER ACTUATOR TEST

1. Disconnect valve to actuator at valve and connect to an external vacuum source equipped with a vacuum gauge, then apply 20 inches Hg vacuum to actuator and seal off vacuum source. If vacuum reading drops, the actuator is leaking and must be replaced.

2. To check actuator, proceed as follows:

a. Check throttle lever, shaft and linkage for freedom of operation. b. Run engine until operating temperature is reached and idle is stabilized with transmission in neutral or park. Note idle speed. c. Apply 20 inches Hg vacuum to actuator, then open throttle slightly and allow to close against extended actuator plunger. Note engine speed. d. Release and reapply 20 inches Hg vacuum and note the RPM to which engine speed increases. If speed is not within 150 RPM, the actuator

plunger may be binding or the actuator diaphragm may be defective. If binding condition does not exist or cannot be corrected, the actuator must be replaced.

e. Release vacuum. If engine speed does not return to within 50 RPM of the speed noted in step 2b, the actuator plunger may be binding. If

binding problem cannot be corrected, then actuator must be replaced.

3. If engine RPM noted in step 2c is not within the specified TRC range, listed under ``Adjusting Throttle Lever Actuator'', the throttle lever actuator must be adjusted.

TRC SYSTEM TEST

1. Connect a tachometer to the distributor ``TACH'' terminal.

2. Start engine and apply throttle until 1890 RPM is indicated on tachometer. The throttle lever actuator should be extended at this speed.

3. Slightly close throttle opening until 1700 RPM is indicated on tachometer. The throttle lever actuator should close at this speed.

4. If the throttle lever actuator operates out of the 1700-1890 RPM limit, replace speed switch.

5. If the actuator does not operate at any speed, note the following:

a. Using a voltmeter, check for voltage at vacuum solenoid and speed switch. A voltage of 12-14 volts should be indicated on both the vacuum

solenoid and speed switch.

b. If voltage is present at one component but not the other, check and/or repair engine wiring harness. c. If voltage is not present at either component, check engine wiring harness electrical connections at distributor and/or bulkhead electrical

connector. Repair as required.

d. If correct voltage is indicated at each component, check for correct solenoid valve operation. Ground solenoid to switch connecting wire

terminal at solenoid connector. Throttle lever actuator should extend.

e. If it does not extend, disconnect solenoid side port hose from actuator hose, and check port orifice for restriction. Clean orifice as required. f.

If hose is not plugged or damaged, replace solenoid.

g. If actuator extends in step d, ground solenoid to switch wire terminal at speed switch. If it does not extend, repair or replace wire connecting

speed switch to solenoid. If it still does not extend, check speed switch ground wire for ground. Voltage should be 0 volts. If not, correct ground speed switch.

h. If actuator still does not extend when engine is operating above 1890 RPM, replace speed switch.

6. If actuator remains extended at all speeds, note the following:

a. Disconnect electrical connector from vacuum solenoid. b. If actuator remains extended, check plugged orifice in solenoid side port. If solenoid side port is not plugged, connect vacuum hose and

recheck system. If actuator still remains extended, remove solenoid connector. If actuator does not close, replace vacuum solenoid.

c. If actuator closes with solenoid connector removed, reconnect wire and remove speed switch connector. If actuator closes, replace speed

switch. If the actuator still does not close, solenoid to switch wire is shorted to ground in the wiring harness, repair or replace as required.

Deceleration Valve: Service and Repair

CONTROL VALVE, ADJUST

1. Disconnect valve to carburetor hose at carburetor and connect to an external vacuum source equipped with a vacuum gauge, then disconnect valve to actuator hose at actuator and connect to vacuum gauge.

2. Firmly place finger over end of bleed fitting and apply minimum of 23 inches Hg vacuum to the control valve. Seal off the vacuum source, then uncover the bleed fitting. The vacuum reading on the actuator side will drop off to zero and the reading on the vacuum source gauge will drop to a value designated as the ``valve set point''. If this value is not 21.5 ± .50 inches Hg for V8-350 or 21 ± .50 inches Hg for V8-454, the valve must be adjusted as follows.

a. To adjust the valve, pry off the plastic cover and turn the screw clockwise to raise the set point or counterclockwise to lower the set point and

recheck setting. If the valve cannot be adjusted, it must be replaced.

THROTTLE LEVER ACTUATOR, ADJUST

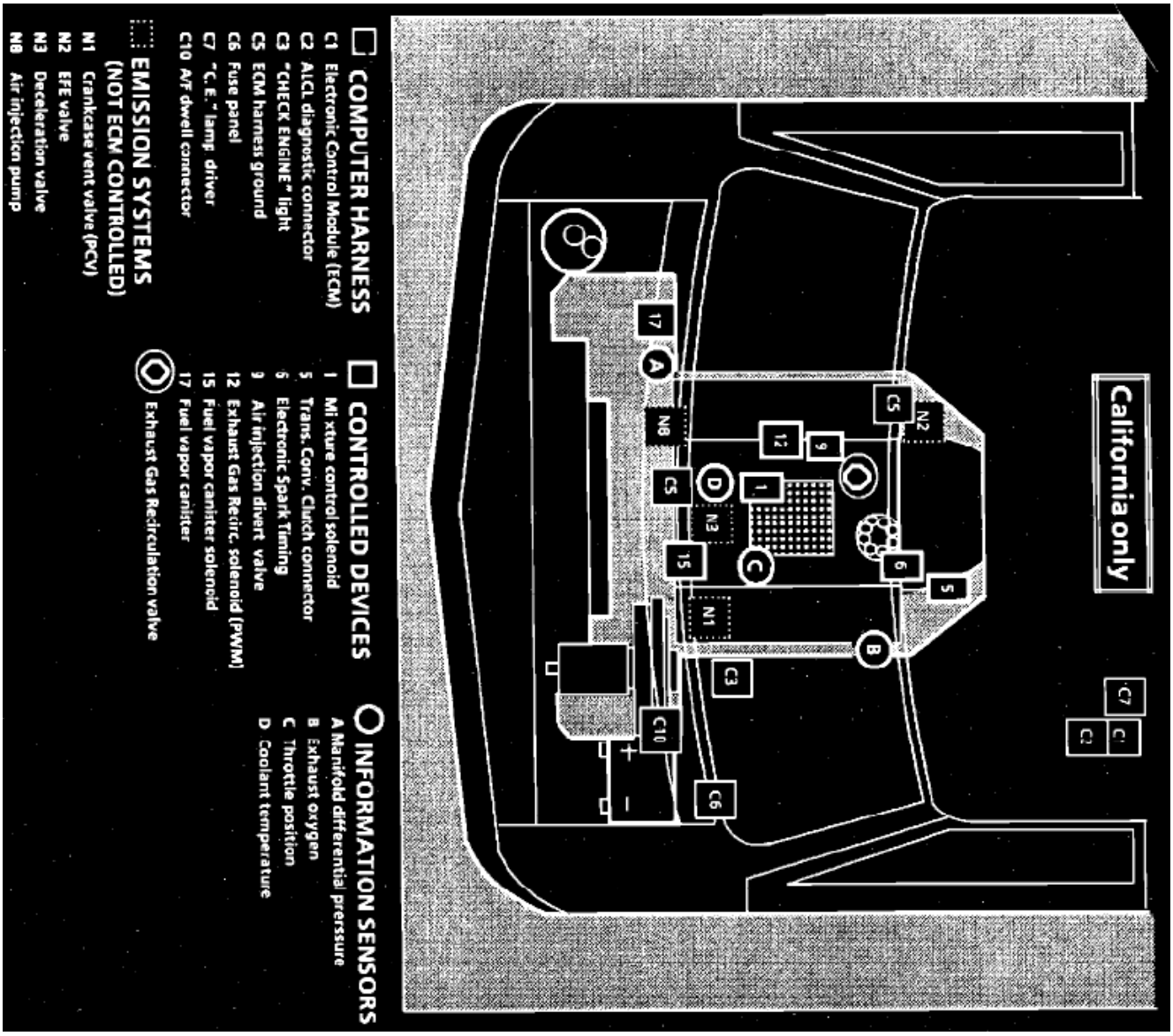
1. Disconnect valve to actuator hose at valve and connect to an external vacuum source equipped with a vacuum gauge.

2. Check throttle lever, shaft and linkage for freedom of operation.

3. Run engine until operating temperature is reached and idle is stabilized with transmission in neutral or park.

4. Apply 20 inches Hg vacuum to actuator, then open throttle slightly and allow to close against extended actuator plunger. Note engine speed.

5. If speed noted above is not within 1475-1525 RPM for V8-350 engines, or 1375-1425 RPM for V8-454 engines, turn the actuator screw in or out as necessary to obtain the desired TRC speed range and repeat step 4, and readjust if necessary.



EFE Valve: Locations

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

Bowl Vent Valve: Testing and Inspection

1. Disconnect carburetor bowl vent vapor hose.

2. Using hand-held vacuum pump, apply vacuum to hose and note gauge reading. Reading should not be more than .5 inches Hg. If vacuum is greater than specified, check for plugged hose or canister filter. If reading remains high, replace vacuum canister.

3. With engine idling at normal operating temperature, again apply vacuum to vapor hose. The line should be blocked and a high vacuum reading should be obtained. If line is not blocked, remove vacuum line from canister and check for presence of vacuum. If no vacuum is available, repair line. If vacuum is available, replace canister.

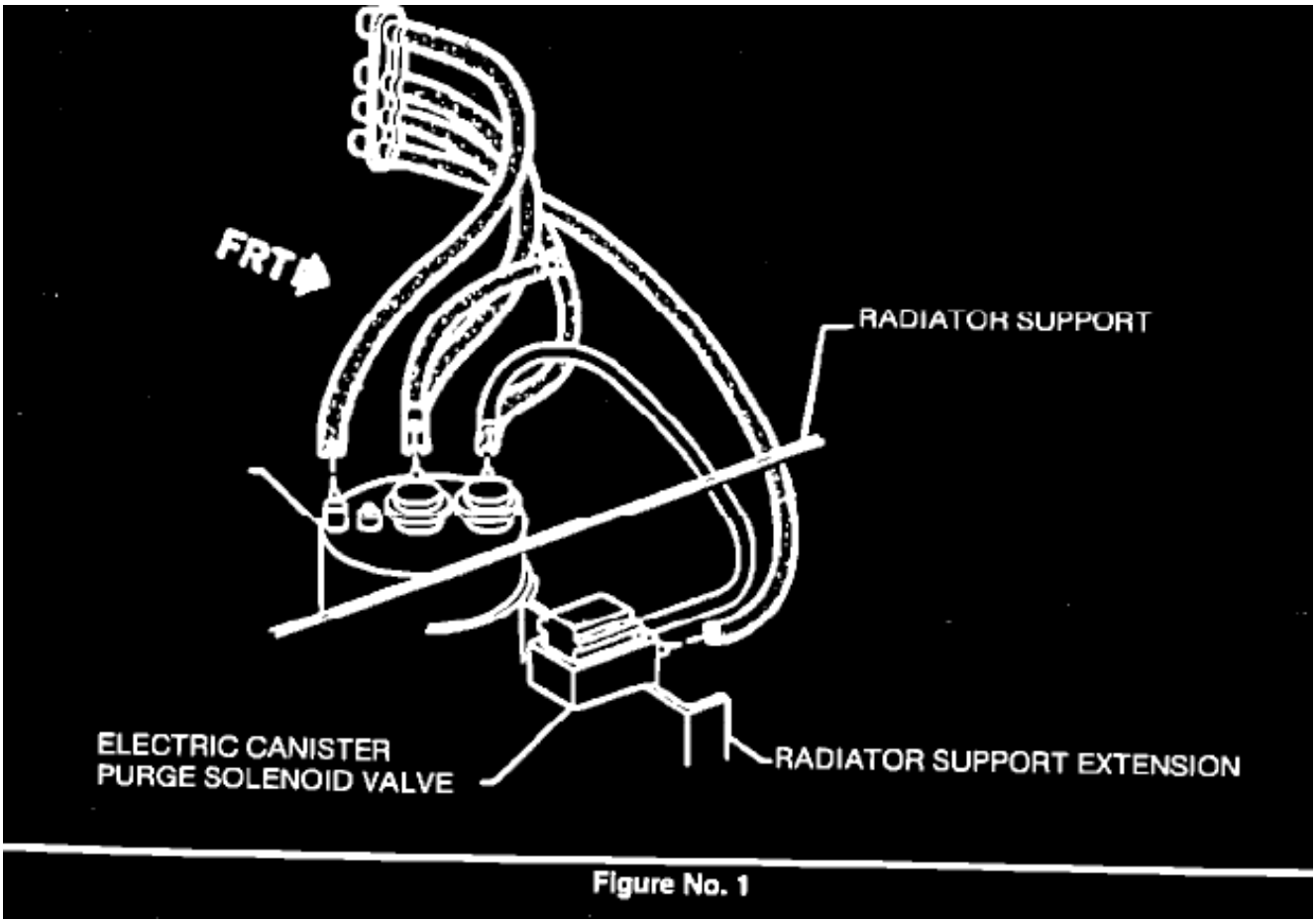


Figure No. 1

Canister Purge Control Valve: Technical Service Bulletins Fuel Evap Purge Solenoid Valve - Inoperative

NUMBER: 86-B-102

GROUP: 6E - Emission Controls

DATE: July, 1986

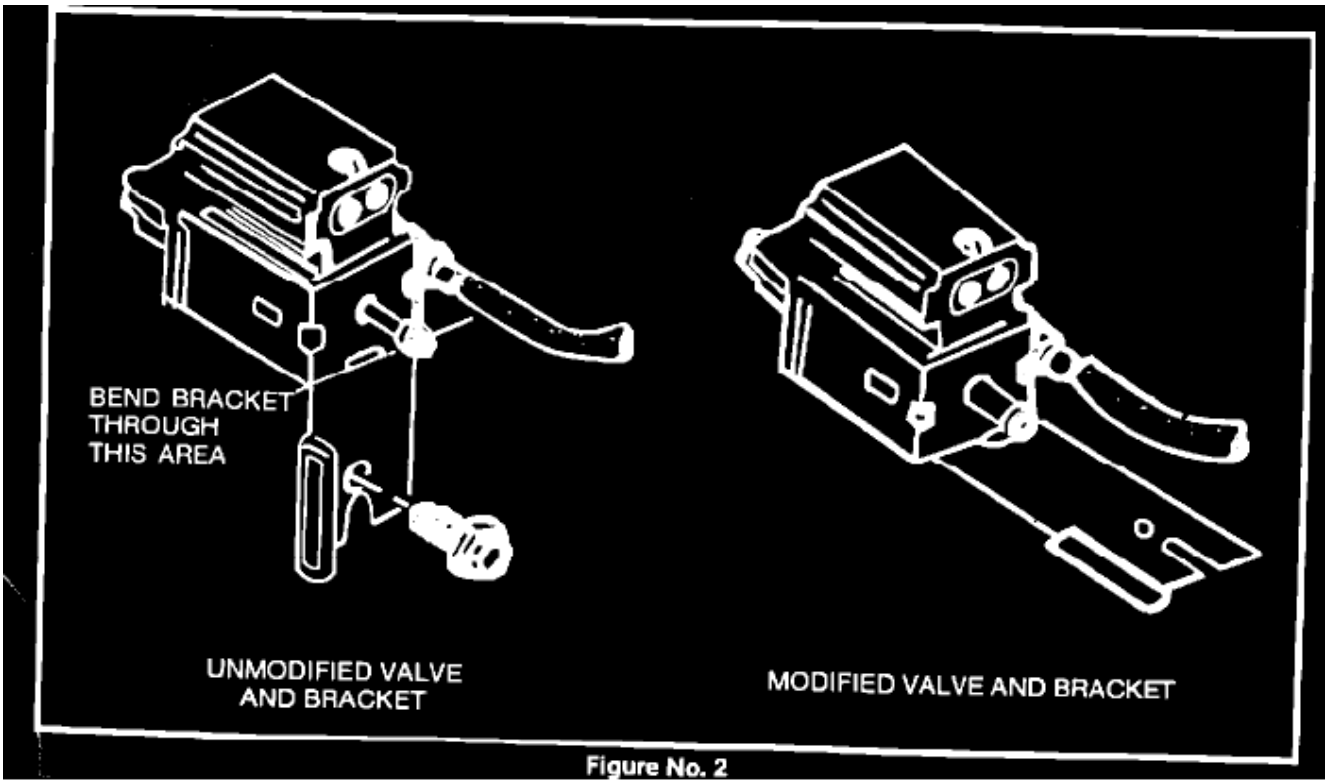
SUBJECT: SHORTED OUT ELECTRIC CANISTER PURGE SOLENOID VALVE AND A FALSE CODE 54

MODELS: 1985-86 G VANS WITH 4.3L, 5.0L, 5.7L ENGINES AND NB2 CALIFORNIA EMISSIONS

FIGURE 1 - ELECTRIC PURGE SOLENOID VALVE

Some 1985, 86 G Vans with NB2 California emissions may experience a shorted out electric purge solenoid valve (see Figure No. 1). This condition may be caused by moisture entering tile electrical portion of the canister purge solenoid valve and setting a false Code 54. If this condition is encountered and the inspection of the solenoid indicates that replacement of the solenoid is required, replace the purge solenoid valve and install a new moisture shield, P/N 14066503, which has been released to correct this condition. The electronic control module (ECM) may also have a

failed quad driver in the mixture control solenoid (M/C) circuit and the ECM should be checked to make sure it was not damaged if the purge solenoid valve is shorted out. If the ECM is damaged, it also must be replaced. Removal and installation procedures for the electric canister purge solenoid valve and the ECM are in Section 6E8, Emissions, of the Light Duty Service Manual. Before the new moisture shield can be installed, modifications to the purge solenoid valve bracket and moisture shield must be completed.



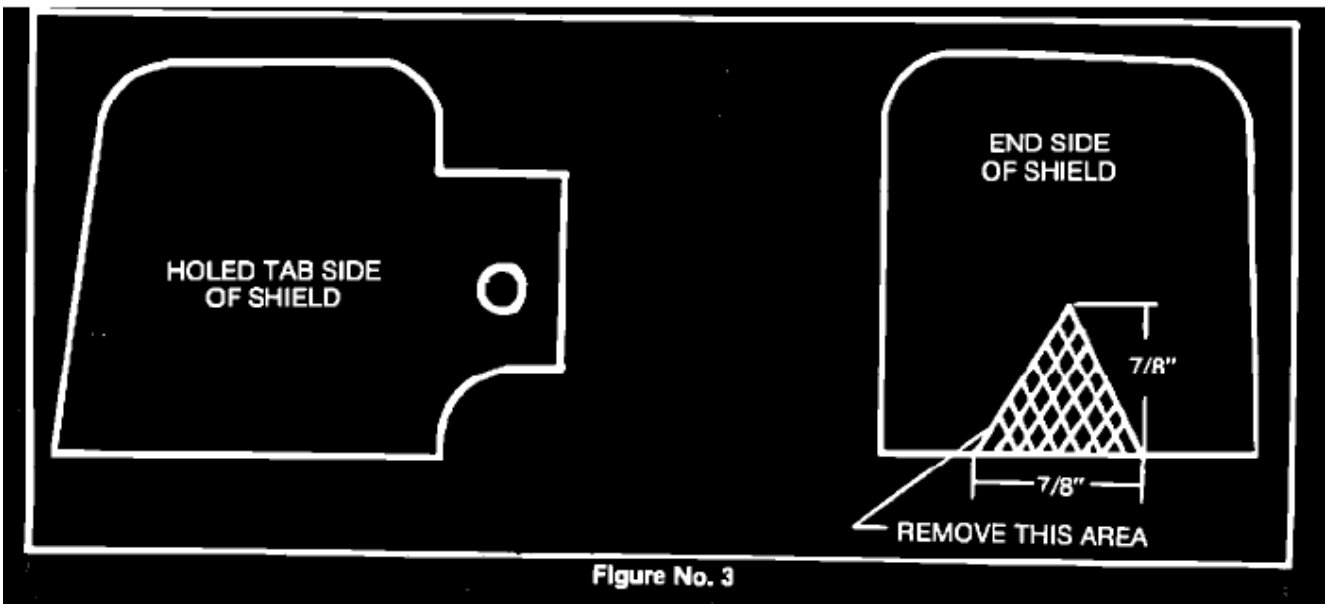


FIGURE 2 - RESHAPE SOLENOID VALVE BRACKET

MODIFICATION: SOLENOID VALVE The solenoid valve bracket must be reshaped to allow the valve to fit inside the moisture shield. Hold the

solenoid valve and bracket firmly and bend the bracket into an "L" shaped form (see Figure No. 2).

FIGURE 3 - MODIFICATION OF MOISTURE SHIELD

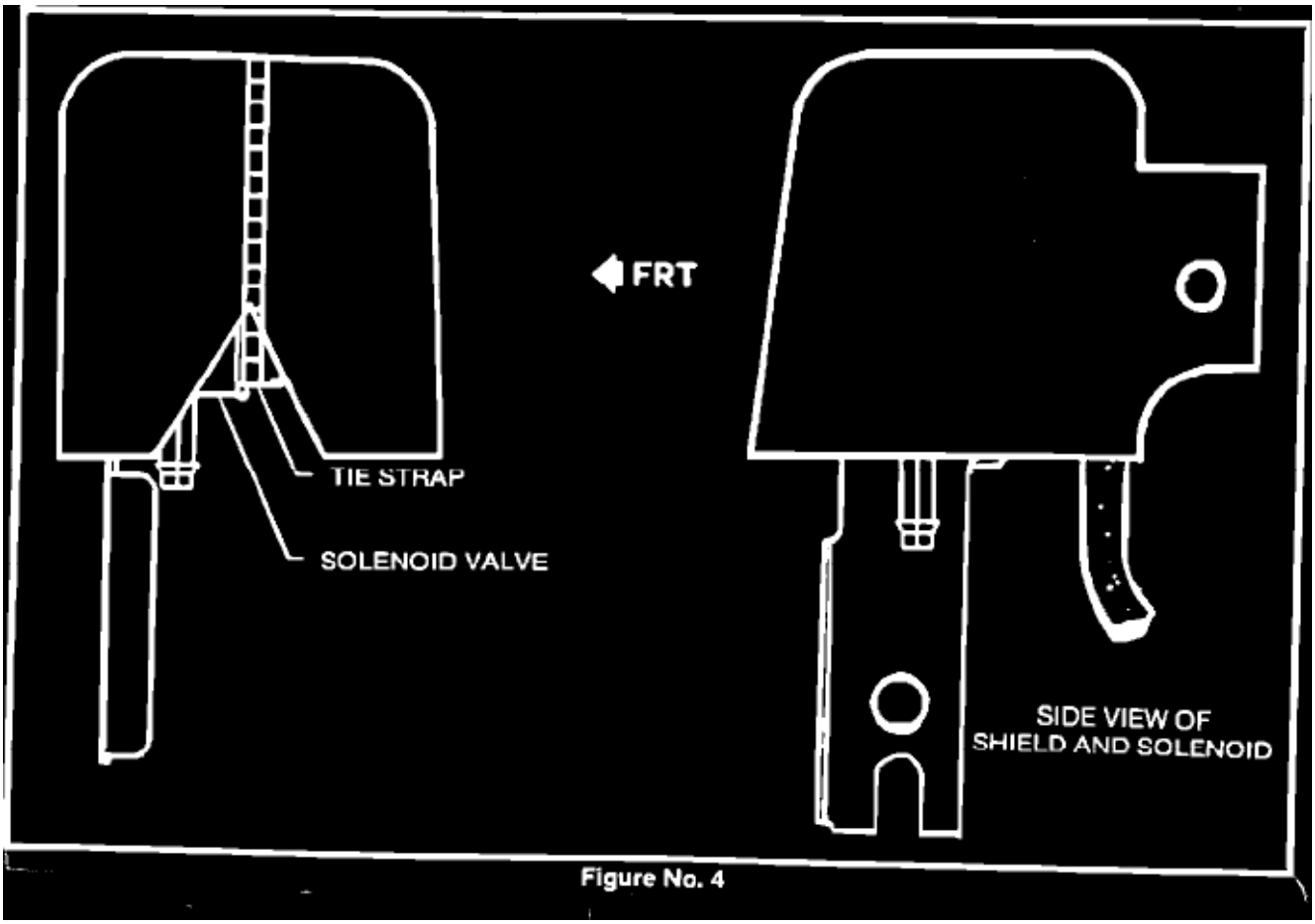
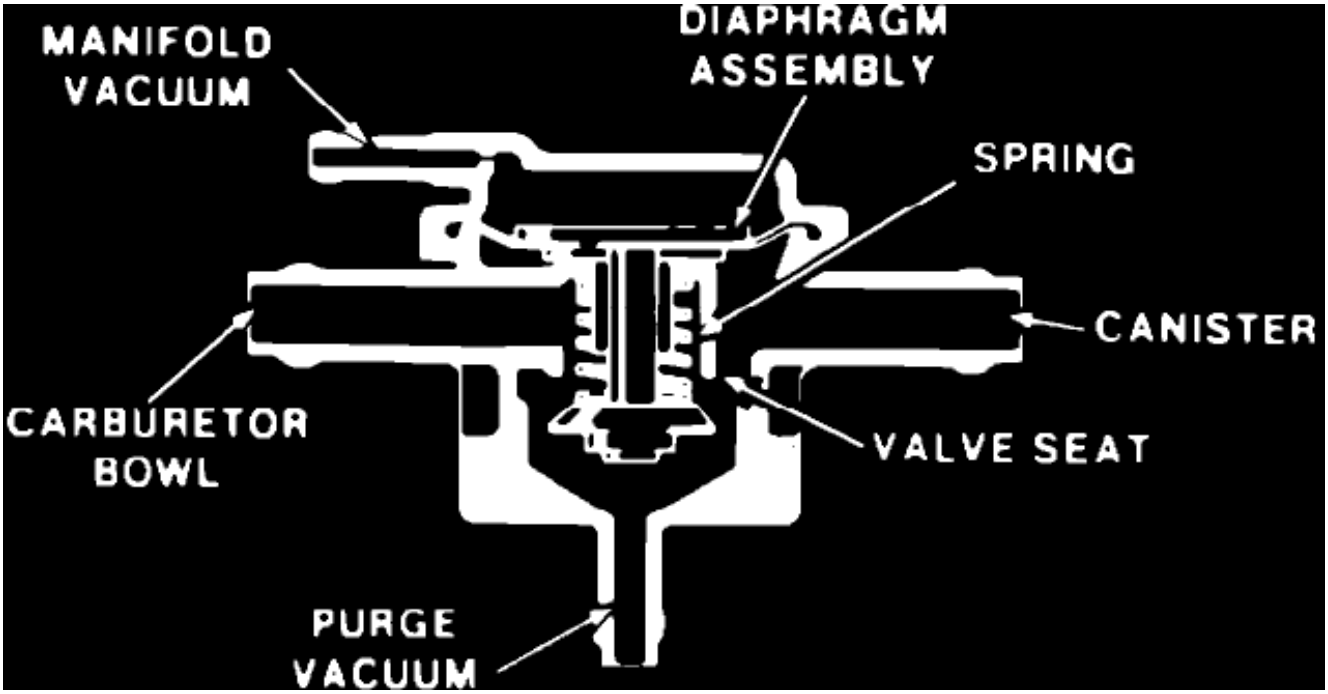


FIGURE 4 - TIE STRAP INSTALLATION

MODIFICATION: MOISTURE SHIELD The moisture shield must be modified to allow the installation of a tie strap to hold the shield to the solenoid

valve. A "V" shaped slot must be cut in both sides of the shield opposite the holed tab side of the shield (see Figure No. 3). After the modification to the shield and solenoid bracket have been completed, install the shield on the solenoid. Install the tie strap, P/N 15501907, tightly around the solenoid and shield (see Figure No. 4) and cut off the excess length. Make sure that the tie strap is positioned between the center hose port and the electrical connection to the solenoid valve.



Canister Purge Control Valve: Description and Operation

Fig. 71 Typical Canister Control Valve (CCV)

Some vehicles use a Canister Control Valve (CCV) to control float chamber fuel vapor storage and purging. The system, Fig. 71, is comprised of a dual tube vapor canister, a canister control valve mounted near the carburetor, and a thermal vacuum switch located in the intake manifold. When the engine is shut off, manifold vacuum is lost at the CCV. The CCV then connects the carburetor bowl vent hose to the thermal vacuum switch. If engine coolant temperature is above the calibration point of the TVS, the switch opens and allows fuel vapors to pass into the canister. When the engine is restarted, manifold vacuum is directed to the CCV. This action closes the bowl vent hose port at the CCV and connects the purge hose to the TVS. When the TVS opens, the canister is purged through the carburetor throttle body which sends ported vacuum through the purge hose.

Canister Purge Control Valve: Testing and Inspection

EXCEPT 1987 V6-262, V8305, 350 & 454 HIGH ALT. ENGINES

1. Disconnect purge valve vacuum line and check for vacuum with engine operating above 1500 RPM. If no vacuum is present, perform EGR check.

2. Using hand-held vacuum pump, apply vacuum to purge valve control diaphragm and note vacuum reading. Valve should hold vacuum. If purge valve loses vacuum, replace vacuum canister.

3. If purge valve holds vacuum, disconnect purge line and check for presence of vacuum with engine running. If no vacuum is present, check PCV hoses and system. Repair or replace as necessary.

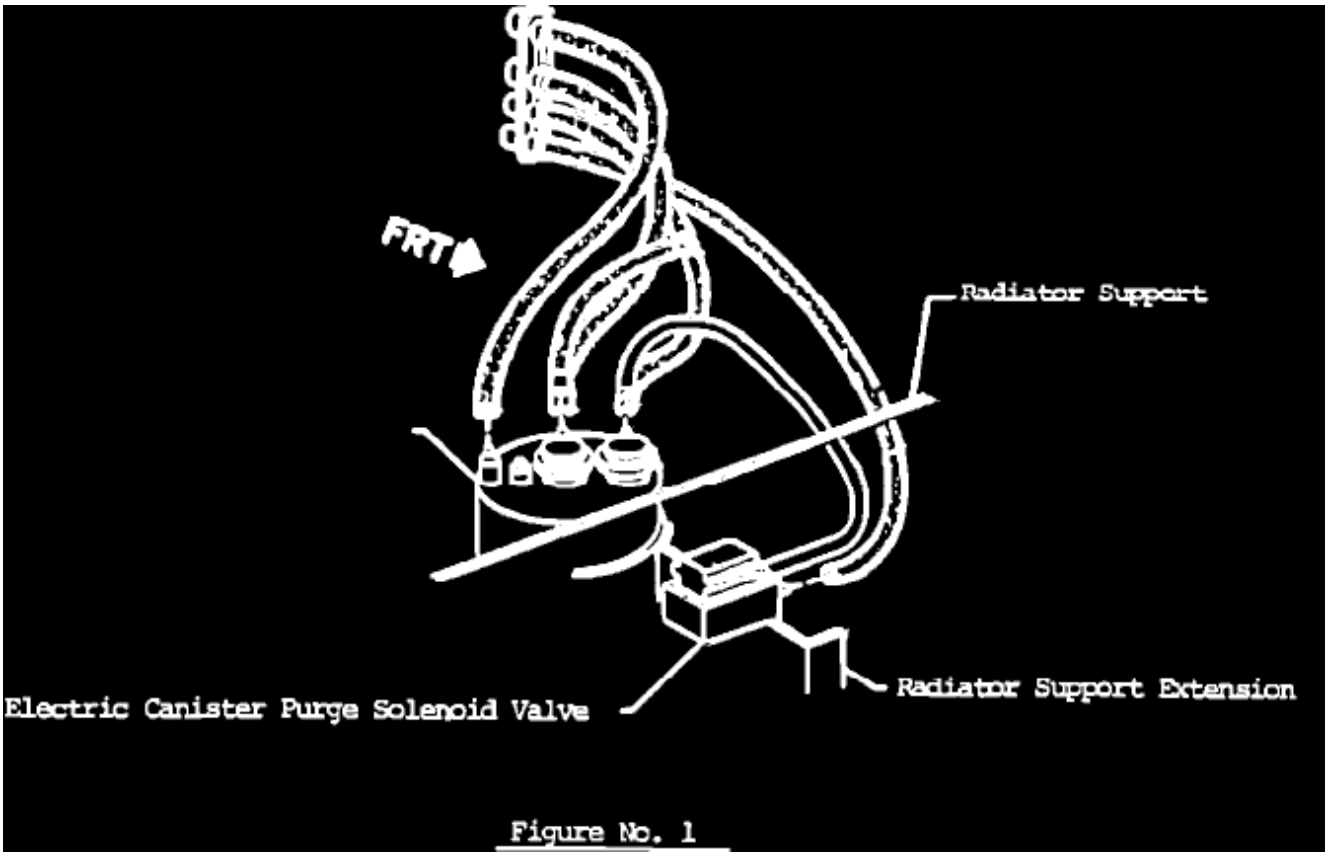


Figure No. 1

Canister Purge Solenoid: Technical Service Bulletins Canister Purge Solenoid Valve - Inoperative

Number: 86-140

Section: 6D

Date: AUG., 1986

Subject: INOPERATIVE ELECTRIC CANISTER PURGE SOLENOID VALVE AND A FALSE CODE 54

Model and Year: 1985-86 G VANS WITH 4.3L, 5.0L, 5.7L ENGINES AND NB2 CALIFORNIA EMISSIONS TO:

ALL CHEVROLET DEALERS

PURGE SOLENOID VALVE

Some 1985-86 G Vans with NB2 California emissions may experience a shorted out electric purge solenoid valve (See Figure No. 1). This condition may be caused by moisture entering the electrical portion of the canister purge solenoid valve, setting a false Code 54. If this condition is encountered and the inspection of the solenoid indicates that replacement of the solenoid is required, replace the purge solenoid valve and install a new moisture shield, P/N 14066503, which has been released to correct the condition. The electronic control module (ECM) may also have a failed quad driver in the mixture control solenoid (M/C) circuit and the ECM should be checked to make sure it was not damaged, if the purge solenoid valve is shorted out. If the ECM is damaged, it also must

be replaced.

Removal and installation procedures for the electric canister purge solenoid valve and the ECM are in Section 6E8, Emissions, of the Light Duty Service Manual.

Before the new moisture shield can be installed, modifications to the purge solenoid valve bracket and moisture shield must be completed.

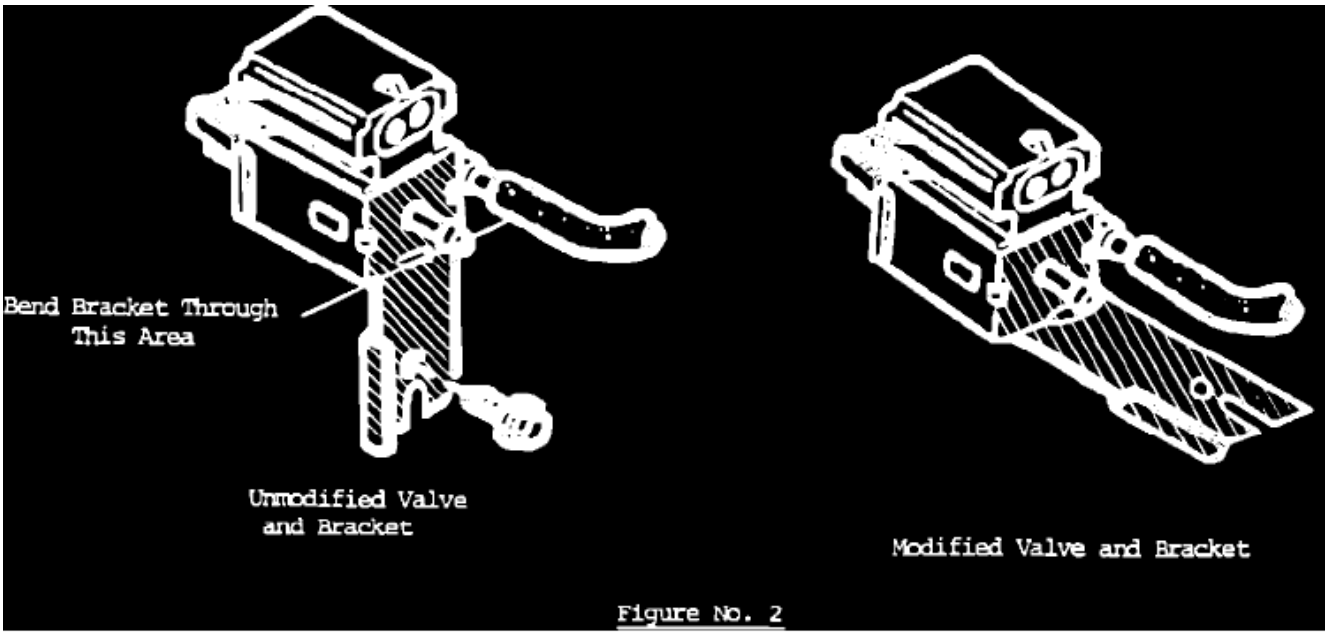


Figure No. 2

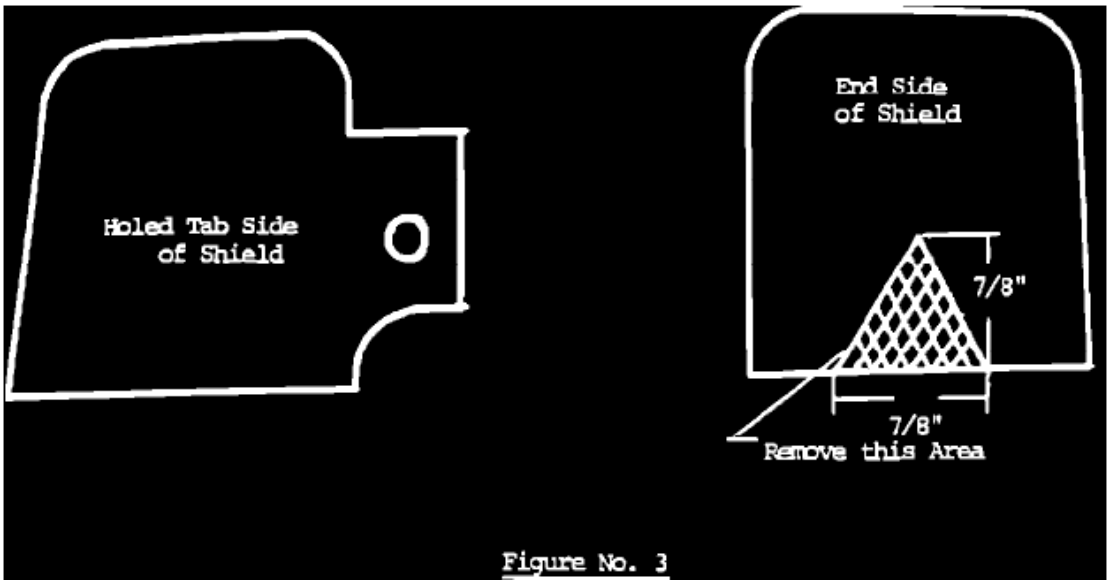


Figure No. 3

VALVE AND BRACKET

MODIFICATION: SOLENOID VALVE

The solenoid valve bracket must be reshaped to allow the valve to fit inside the moisture shield. Hold the solenoid valve and bracket firmly and bend the bracket into an "L" shaped form (See

Figure No. 2).

SHIELD

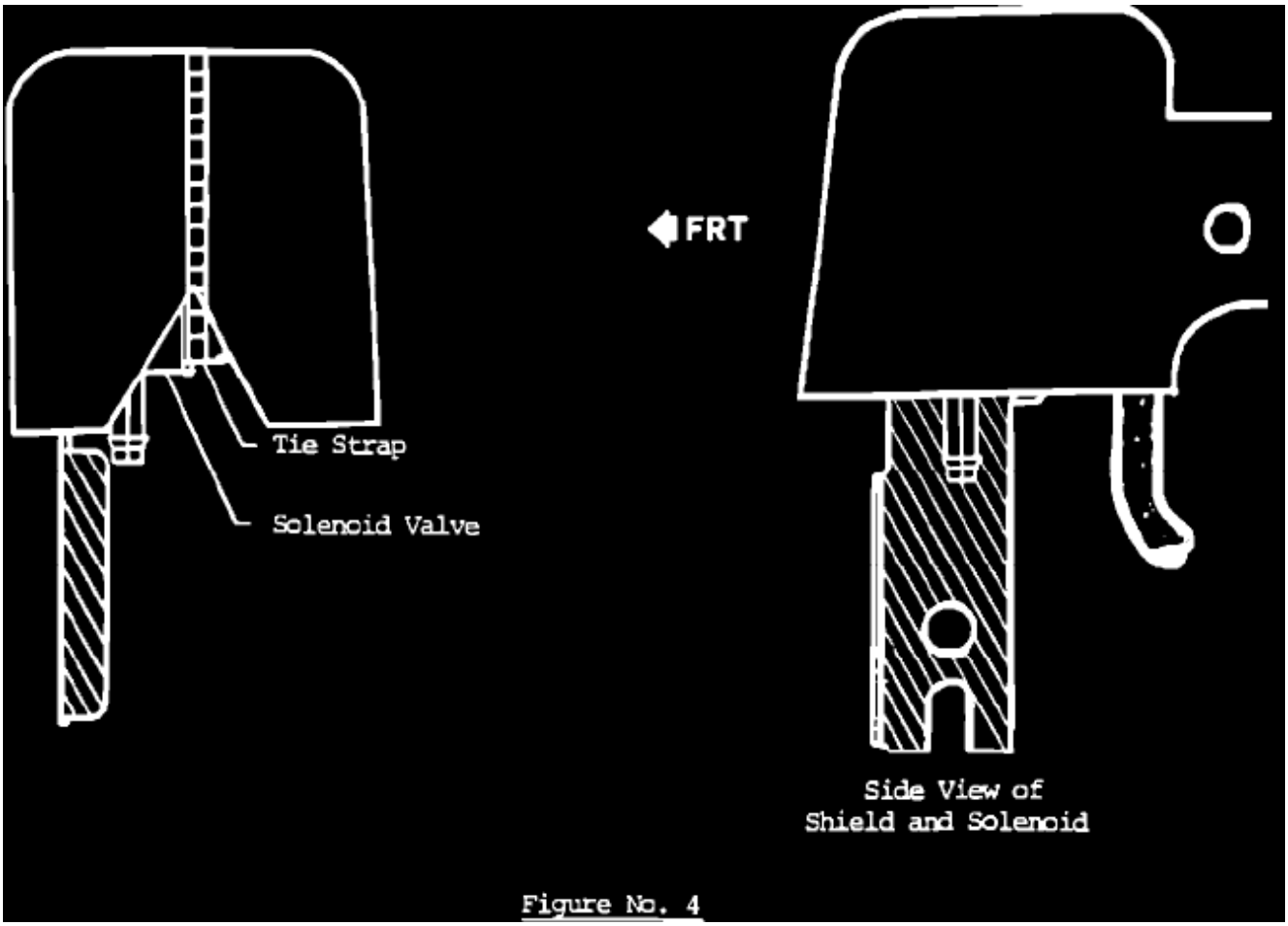
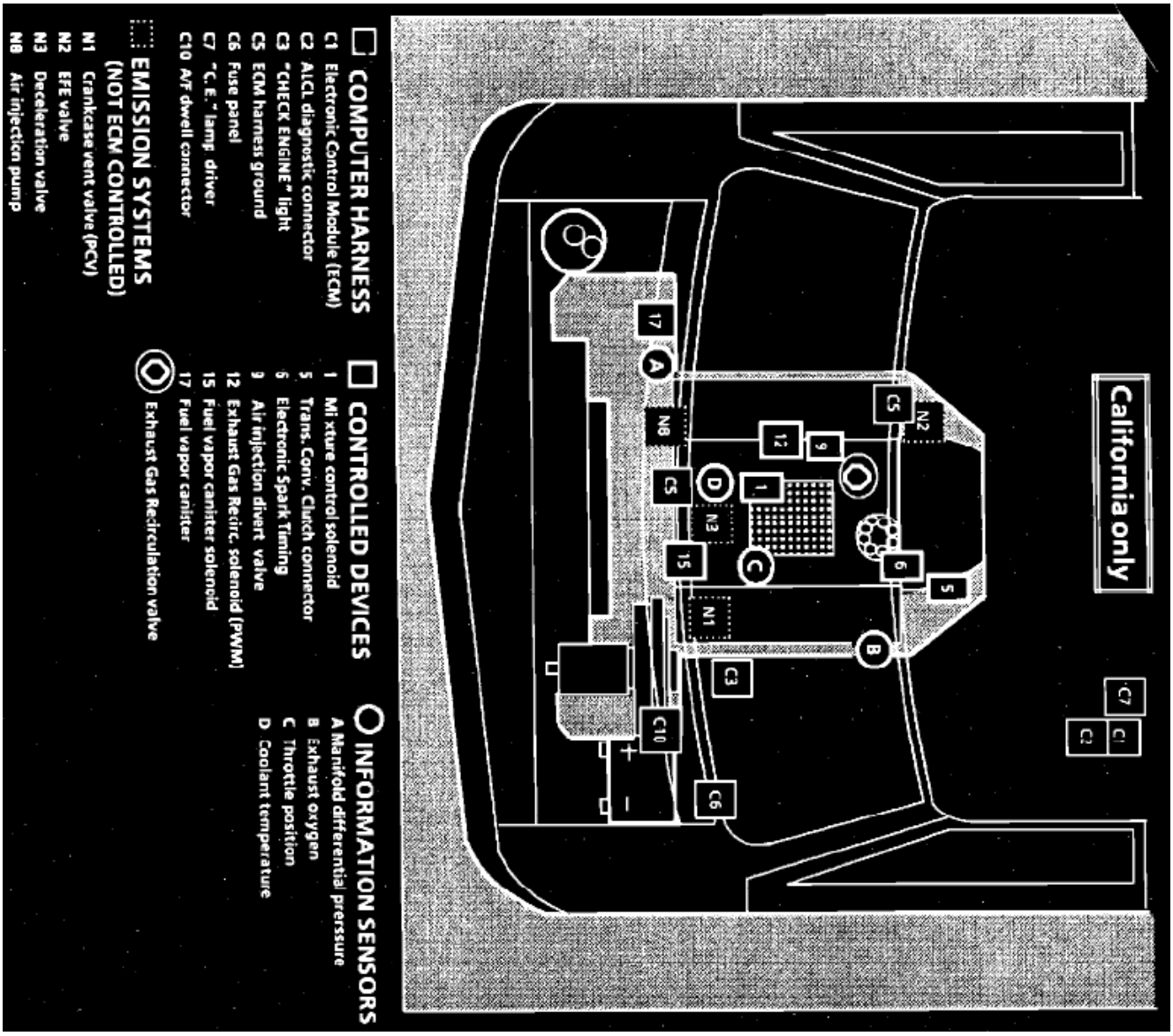


Figure No. 4

SOLENOID VALVE AND SHIELD

MODIFICATION: MOISTURE SHIELD

The moisture shield must be modified to allow the installation of a tie strap to hold the shield to the solenoid valve. A "V" shaped slot must be cut in both sides of the shield opposite the holed tab side of the shield (See Figure No. 3) . After the modification to the shield and solenoid bracket have been completed, install the shield on the solenoid. Install the tie strap, P/N 15501907, tightly around the solenoid and shield (See Figure No. 4) and cut off the excess length. Make sure that the tie strap is positioned between the center hose port and the electrical connection to the solenoid valve.

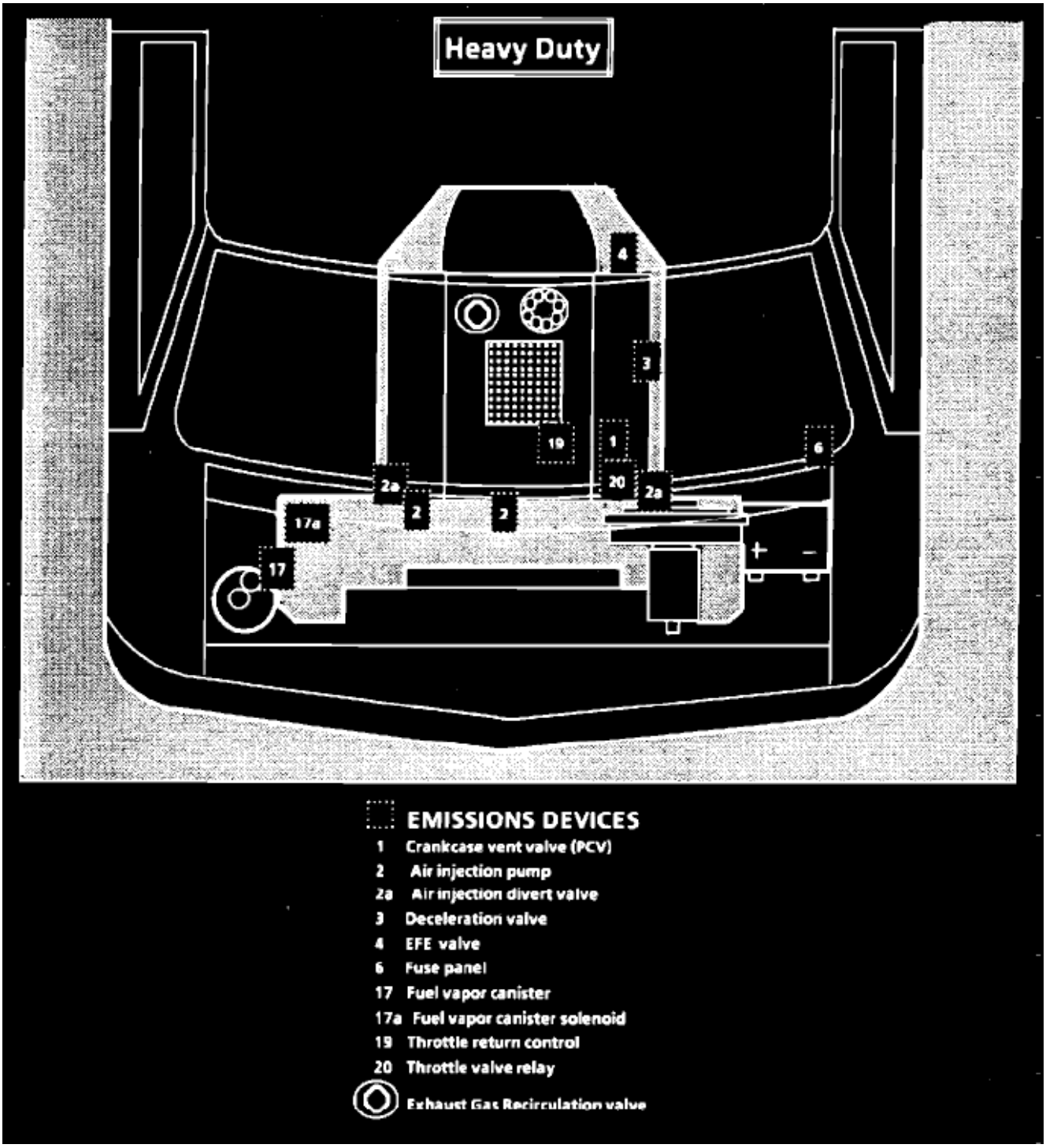


Canister Purge Solenoid: Locations California

Underhood & Engine Components.

RH Side Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Canister Purge Solenoid: Locations Heavy Duty Emissions

Underhood & Engine Components

RH Front Of Engine Compartment

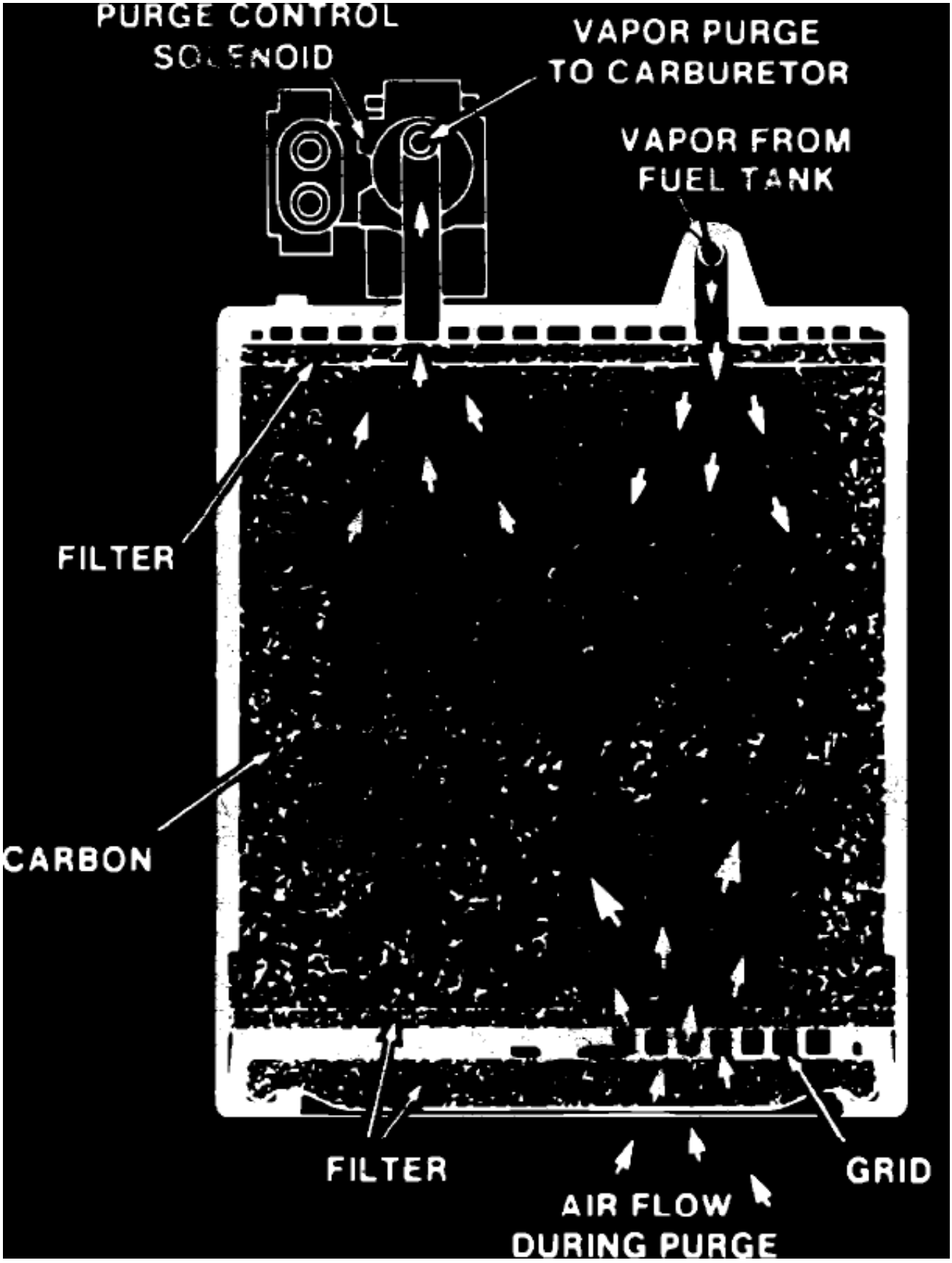
Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

Canister Purge Solenoid: Description and Operation Computer Command Control (C3) System

ECM controls vacuum to the purge valve through the purge solenoid. -

When the engine is cold (open loop), the solenoid valve is energized, blocking vacuum to the purge valve.

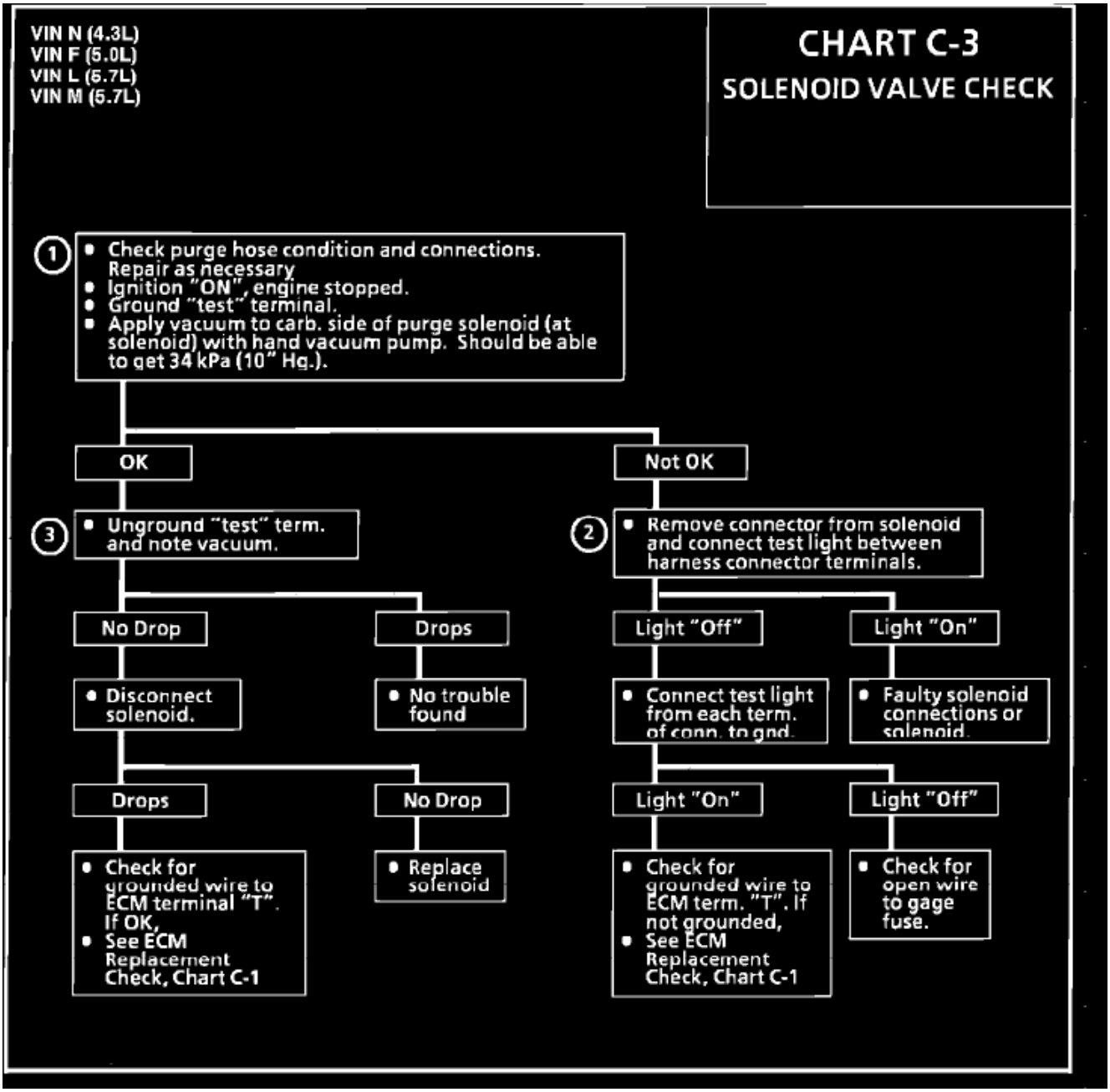
- When the engine is warm (closed loop) and operating above a preset engine or vehicle speed the solenoid valve is de-energized, allowing vacuum to be applied to the purge valve.



Canister Purge Solenoid: Description and Operation Vapor Storage Canister, Fuel Injected Engines

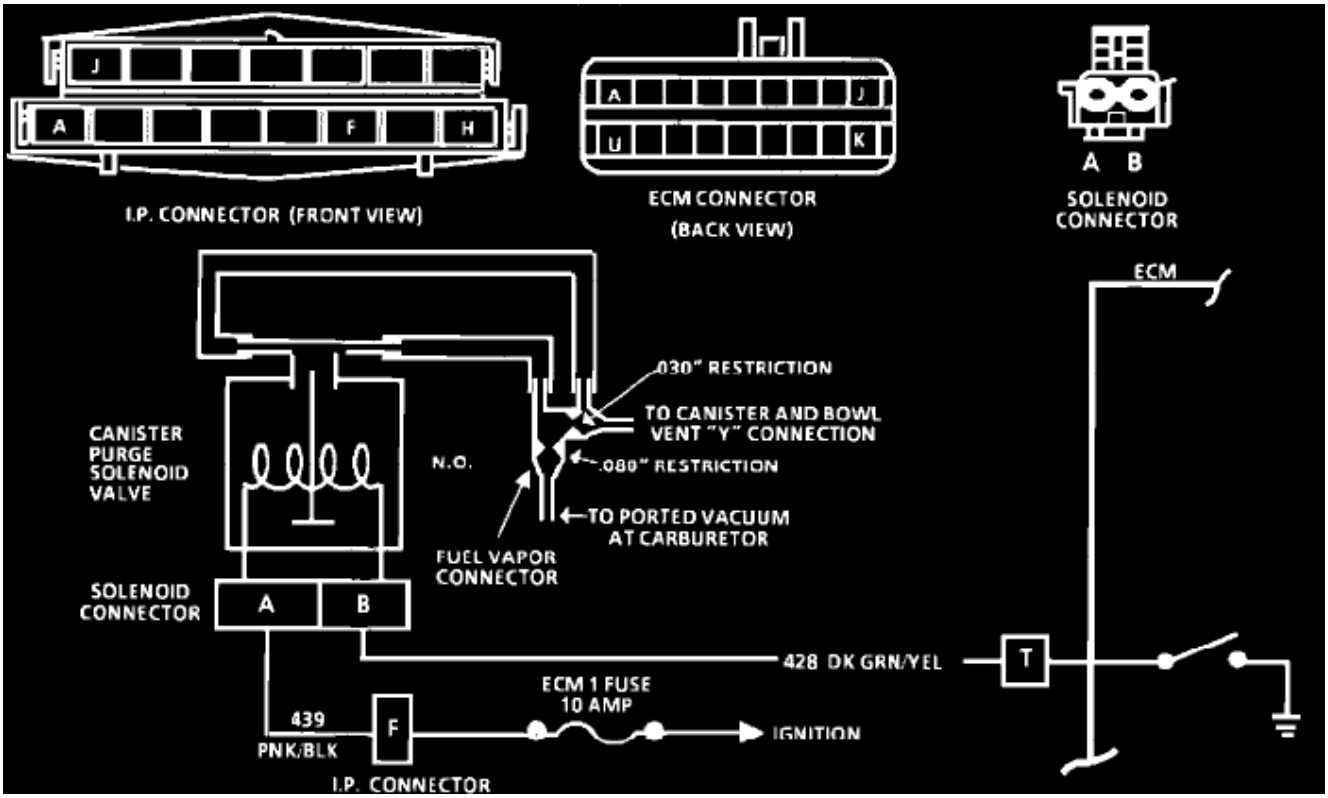
Fig. 72 Charcoal canister with solenoid operated purge valve

Some engines equipped with Computer Command Control (C-3) and V6 engines with Throttle Body Injection (TBI) use an ECM operated solenoid to control canister purge vacuum, Fig. 72. The ECM completes the solenoid ground path, energizing the solenoid to block purge vacuum and de-energizing the solenoid to allow the canister to be purged. The ECM energizes the solenoid during cold engine operation, at idle and when the vehicle is stopped with the engine running. The ECM de-energizes the solenoid and allows canister purge during normal engine operation, with the throttle open and road speed above approximately 5 m.p.h..



Canister Purge Solenoid: Testing and Inspection

Chart C-3 - Solenoid Valve Check



Wiring Diagram for Chart C-3 - Solenoid Valve Check

CHART C-3 - SOLENOID VALVE CHECK

Circuit Description:

Canister purge is controlled by a solenoid valve that allows manifold vacuum to purge the canister when de-energized. The ECM supplies a ground to energize the solenoid (purge off). The solenoid is energized (no purge) by grounding the test terminal with the ignition "ON" and engine stopped, or with the engine running if the following are met:

^ Engine run time less than specified.

^ Coolant temperature below a given value.

^ TPS below a given value.

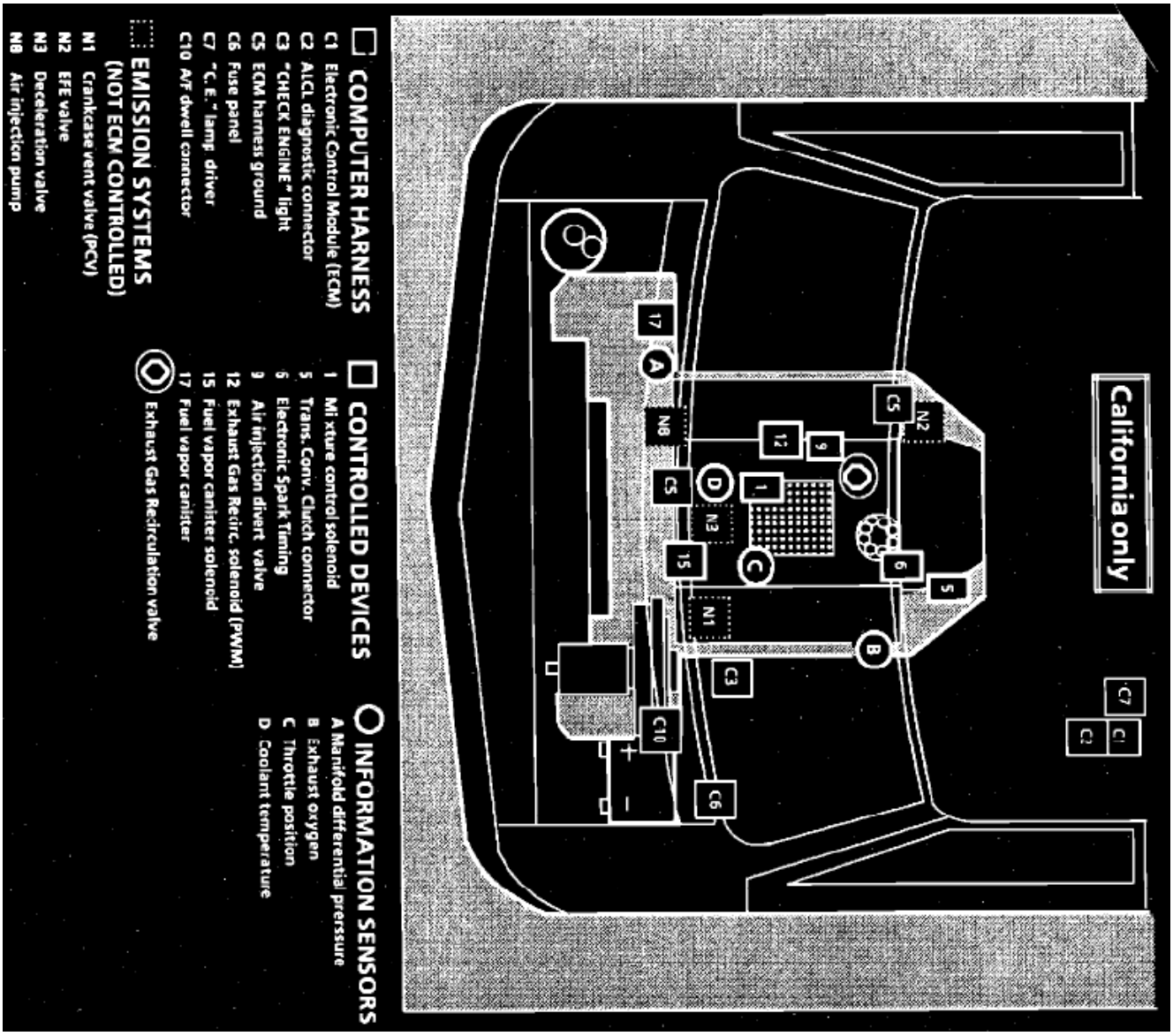
If the above are not met, the solenoid valve is not energized.

Test Description:

1. Checks to see if solenoid is energized and will not allow vacuum to pass.

2. Checks to see if signal to energize solenoid (Light "ON") is present at the solenoid. Light "ON" is normal and would indicate no fault in ECM or circuit to solenoid.

3. Checks to see if solenoid passes vacuum when "test" terminal is ungrounded (solenoid de-energized). It should open and keep the pump from building up a vacuum.

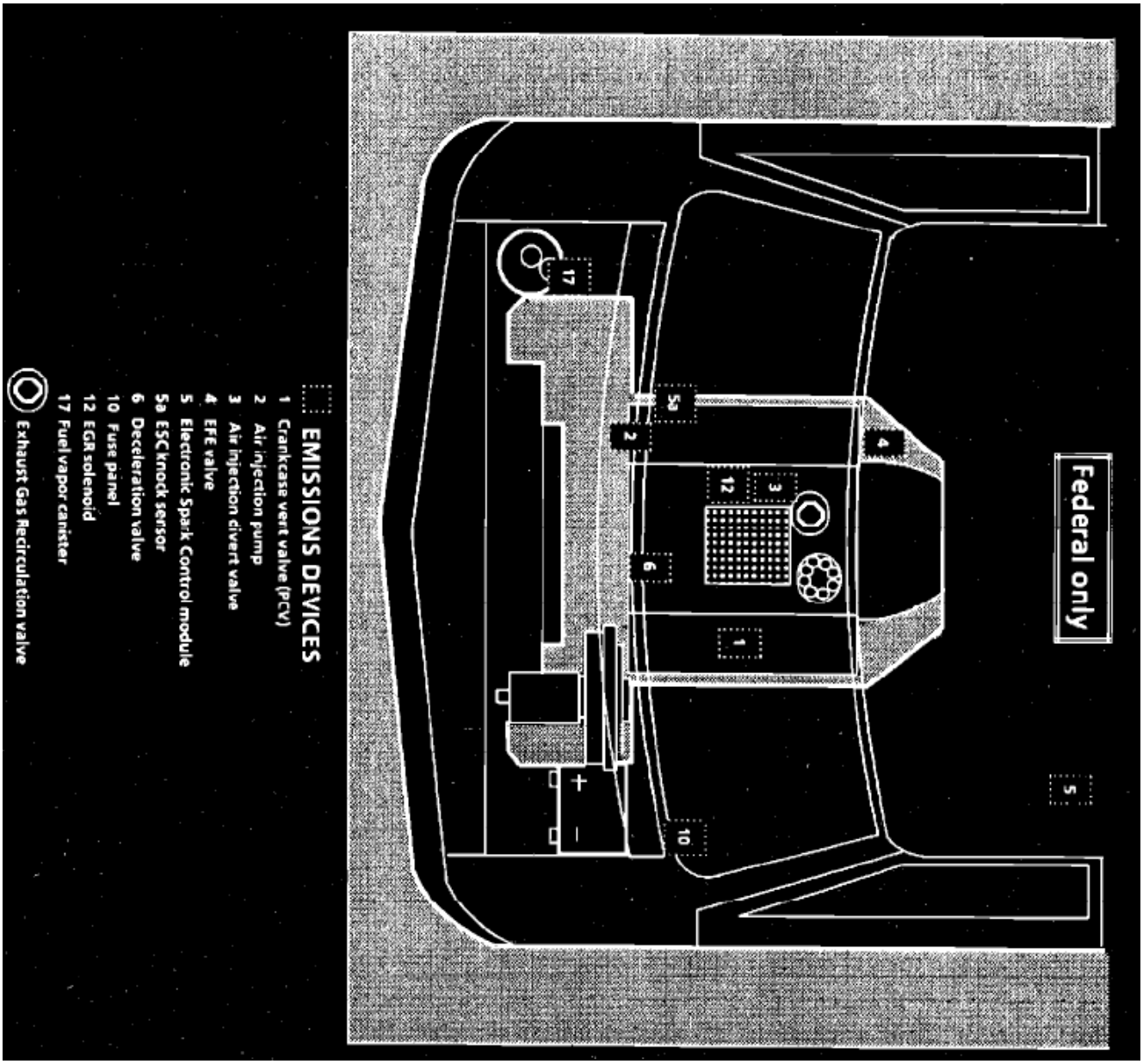


Evaporative Emission Control Canister: Locations California

Underhood & Engine Components.

RH Front Of Engine Compartment

Applicable to: 1985 G Series w/5.0L & 5.7L California

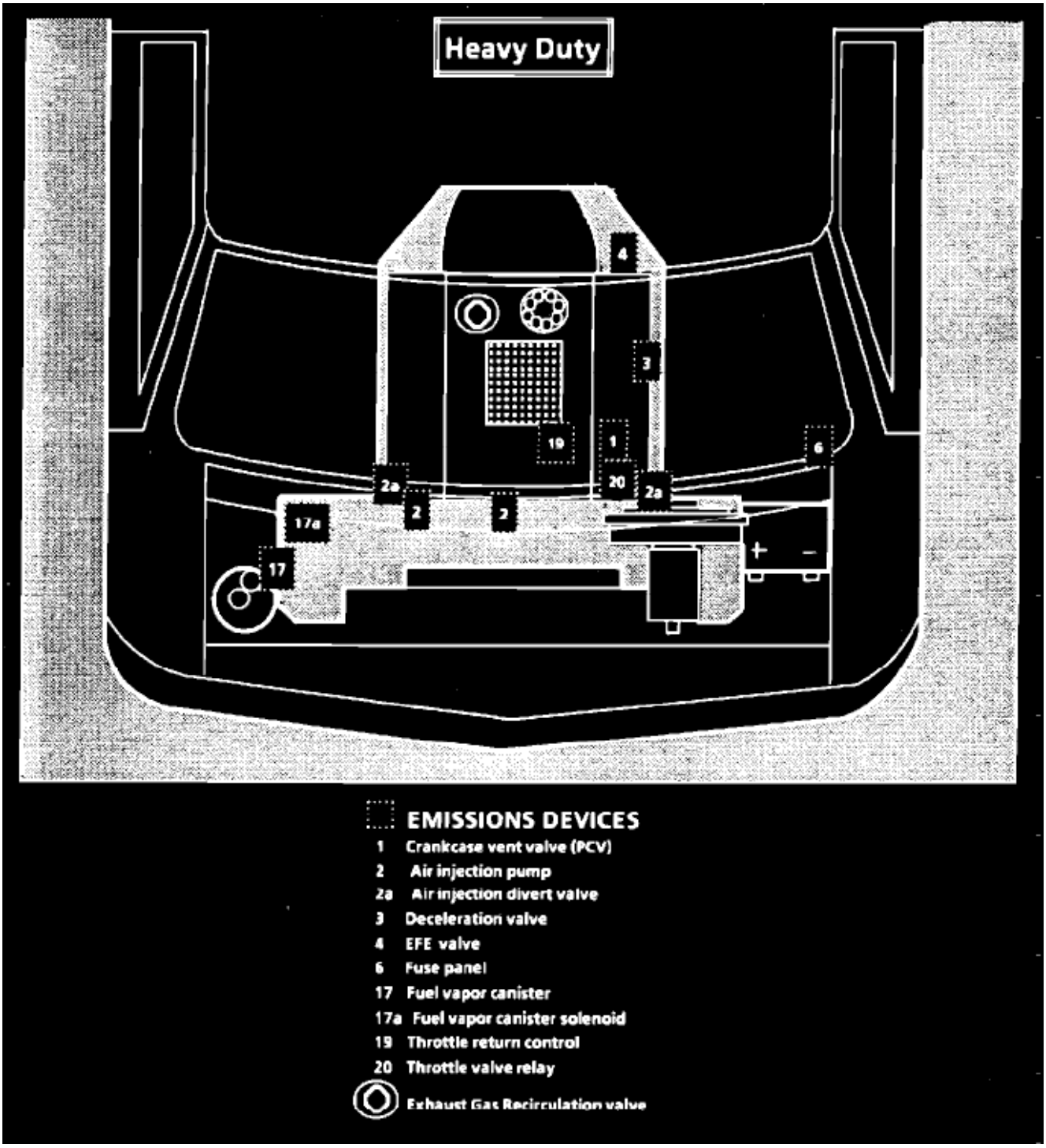


Evaporative Emission Control Canister: Locations Except California

Underhood & Engine Components.

RH Front Of Engine Compartment

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

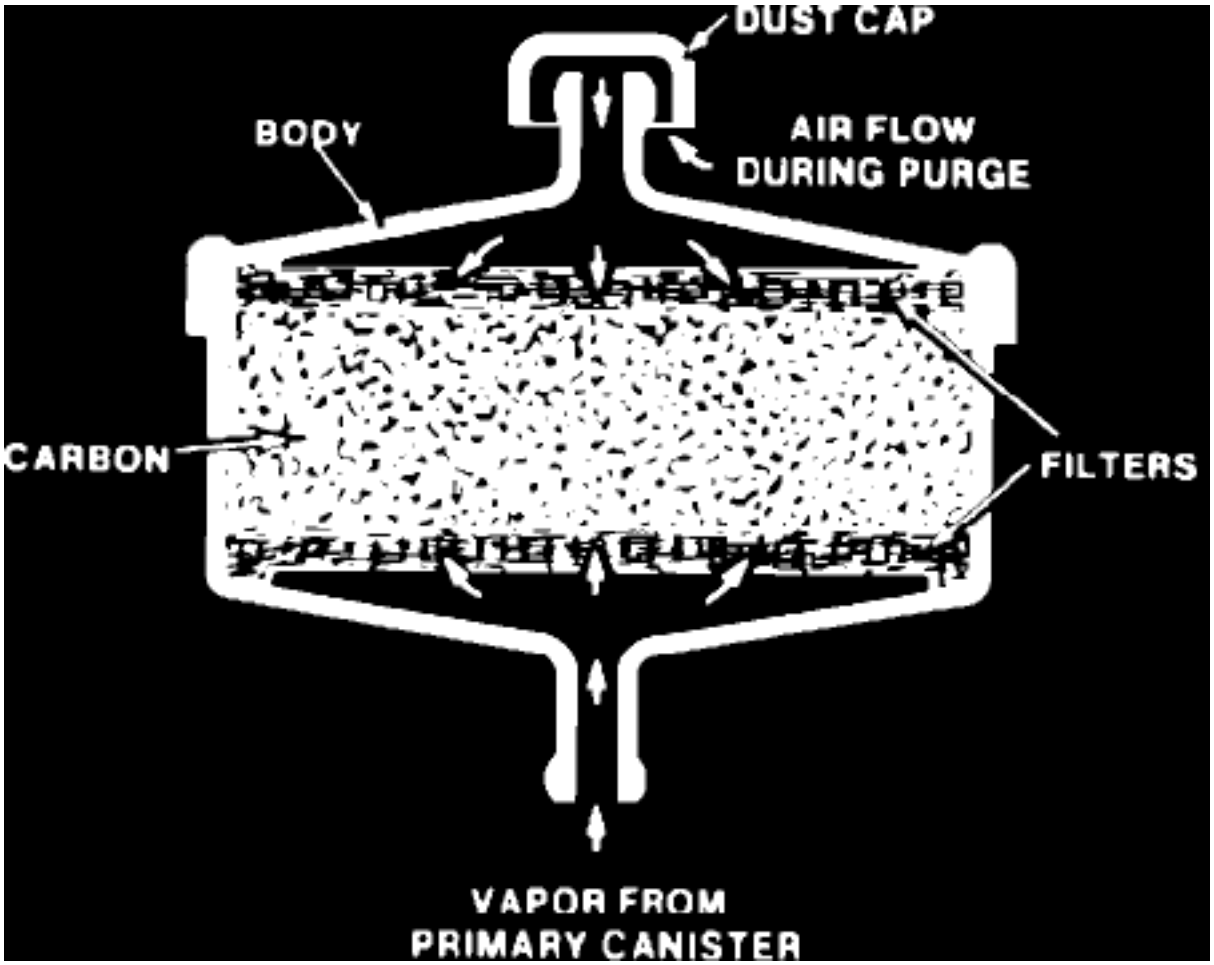


Evaporative Emission Control Canister: Locations Heavy Duty Emissions

Underhood & Engine Components

RH Front Of Engine Compartment

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions



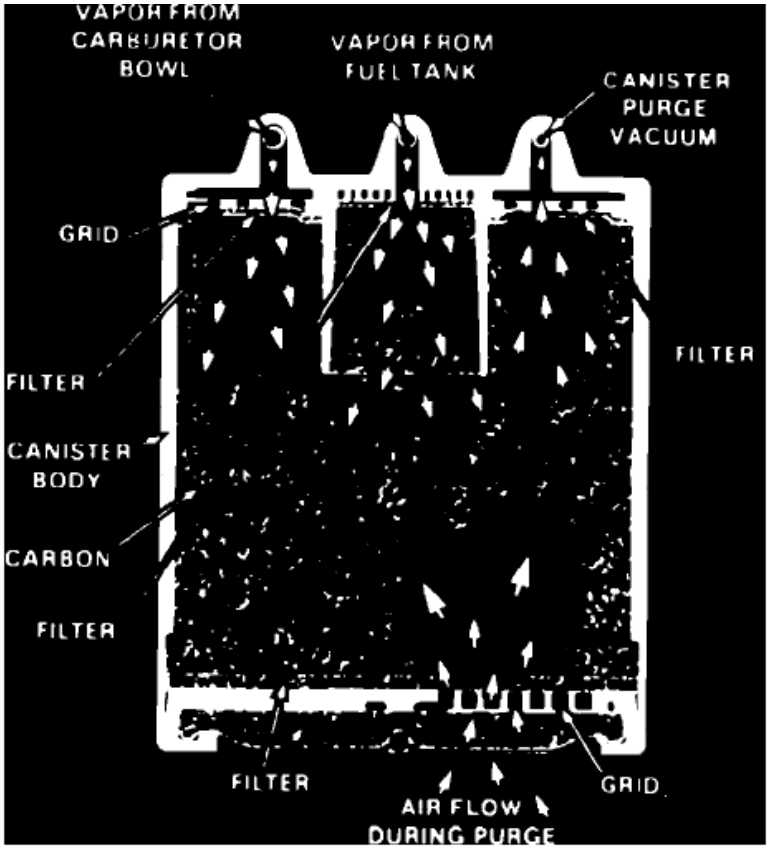
Evaporative Emission Control Canister: Description and Operation Vapor Storage Canister, Carbureted Engines

Auxiliary Canister

Fig. 60 Auxiliary charcoal canister

The auxiliary canister (ACC), Fig. 60, is added to some systems with enlarged fuel capacity (dual or optional fuel tanks) to increase the vapor storage capacity of the EEC system. The auxiliary canister is used in conjunction with a closed bottom main canister and connected to the main canister purge air inlet. The auxiliary canister stores vapor overflow from the main canister, and during purging, air is drawn into the system through the auxiliary canister vent.

Single Stage Type Vapor Canister



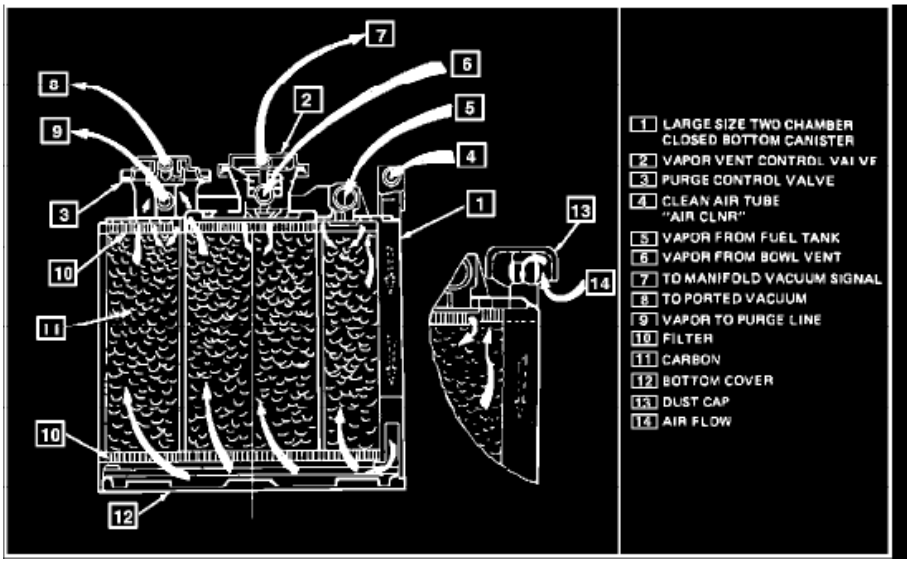
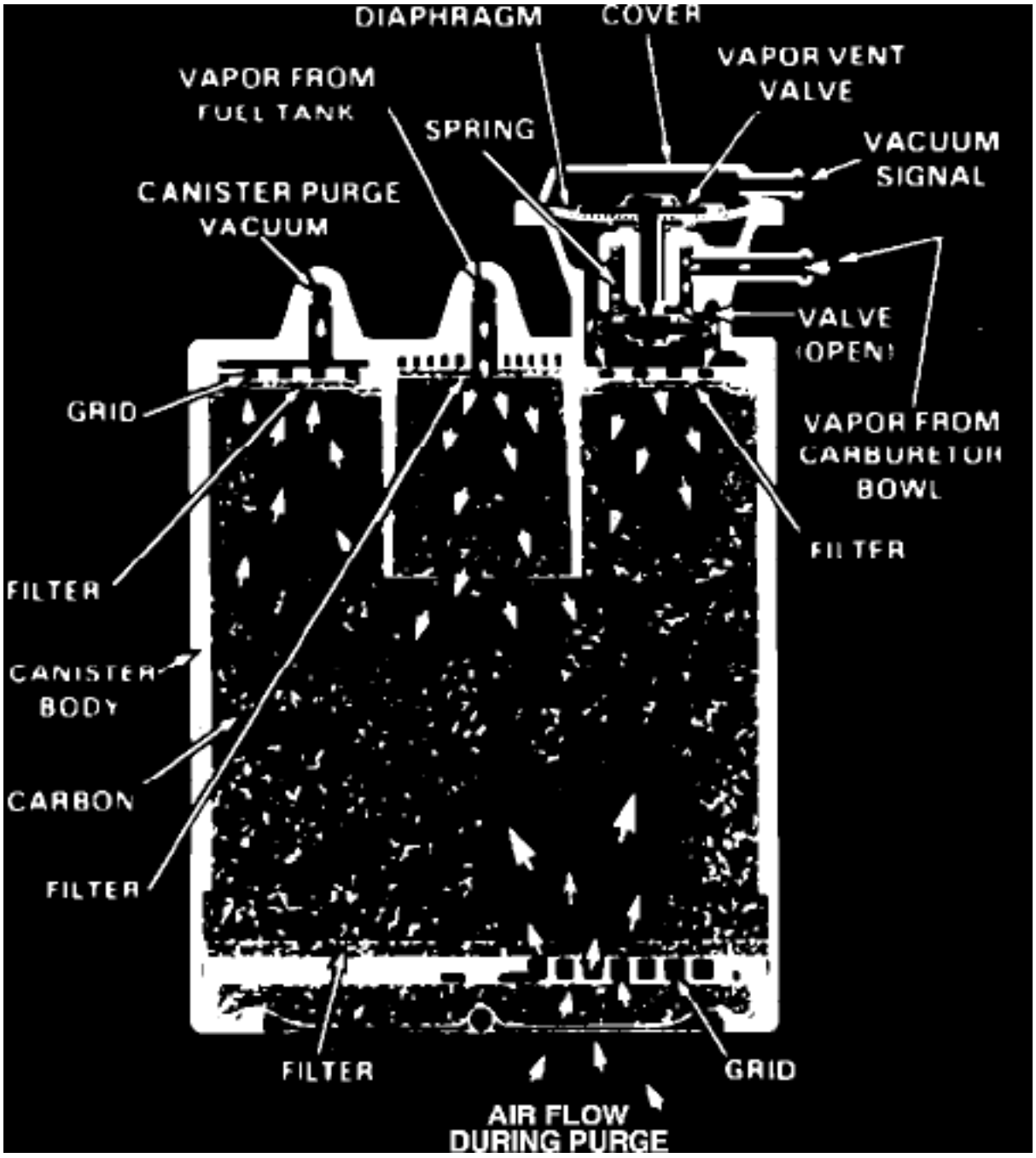


Fig. 61 Single stage charcoal canister

This canister, Fig. 61, absorbs fuel vapors from the fuel tank through a tube on the canister marked ``Fuel Tank'' and from an area just above the carburetor float bowl through a tube marked ``Carb Bowl''. The storage of fuel vapors occurs when the engine is not running. During engine operation, fuel vapors pass through a hose connected to the canister tube marked ``Purge'' and into a port on the carburetor, where they are mixed with carburetor inlet air and burned during the combustion process. Some single stage type vapor canisters are equipped with two, rather than three tube ports. However, the principles of operation are identical for both models.

Purge Valve Type Vapor Canister

Fig. 63 Purge valve type canister. 1984-87 carbureted models



This system Fig. 63, absorbs and stores fuel vapor in a carbon element until it can be removed and burned during normal combustion process. The canister is equipped with a vapor bowl vent control valve and a canister purge control valve which are both mounted on the canister. The bowl vent control valve operates as follows:

a. When the engine is off, there is no vacuum through the vacuum signal tube to the valve diaphragm, spring tension opens the valve. Fuel vapors formed in the carburetor float bowl are pressurized to the point where they flow from a tube in the carburetor float bowl through a connecting hose marked ``Carb Bowl'' in the canister cover. Vapors travel past the open vent valve

through the filter in the canister onto the activated charcoal, where they are stored until purging of the canister occurs. When the engine is running, vacuum is supplied through a tube marked ``Man Vac'' to the vent valve diaphragm. The diaphragm moves upward, raising the vent valve upward, against spring tension, allowing the valve to seal the passage venting fuel vapors from carburetor float bowl to canister. When engine is stopped, spring tension opens the valve to allow venting of the carburetor float bowl.

The canister purge control valve operates as follows:

b. Fuel vapor is inducted into the engine and is controlled by an orifice in the purge control valve. Ported vacuum signals to the purge control valve is controlled by a thermal vacuum switch (TVS) which delays purging until a specified engine temperature is reached. With throttle closed, the purge control valve diaphragm is seated by spring tension and no purging occurs. With throttle opened, ported vacuum is applied to the purge control valve. With vacuum applied to the diaphragm, the valve is opened when ported vacuum develops sufficient force to overcome preload of the diaphragm closing spring and purging takes place until the throttle is closed to a position which reduces ported vacuum to a level at which it can no longer overcome diaphragm spring tension.

Vent Valve Type Vapor Canister

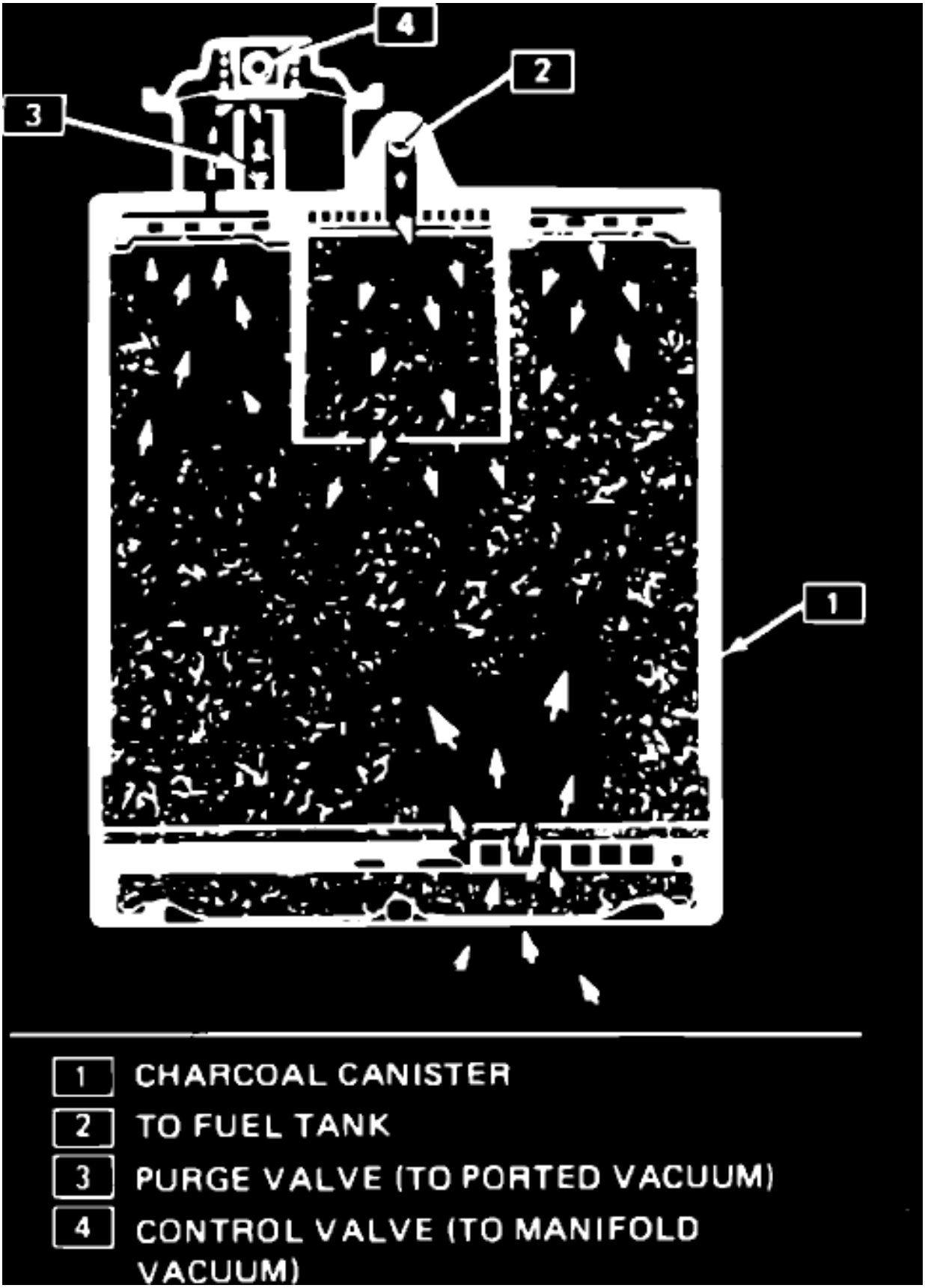
Fig. 64 Vent valve type canister

This canister, Fig. 64, has a vent valve system which is an integral part of the canister assembly. The canister collects fuel vapors from the carburetor float bowl through a hose to the vent valve. The vent valve assembly consists of a housing and tube molded into the canister cover, vent valve, valve spring, diaphragm, and diaphragm cover with integral vacuum signal line. When the engine is off, no manifold vacuum is available to the vent valve diaphragm, thereby enabling the valve spring to keep the valve open. At this point, fuel vapors in the carburetor float bowl are pressurized and then directed from a tube in the float bowl, through a connecting hose, to the ``Car Bowl'' tube in the canister cover. The vapors then flow past the open vent valve through the upper canister filter and into the charcoal bed, where they are stored until normal purging of the canister occurs. When the engine is running, manifold vacuum is applied to the vent valve diaphragm through the signal tube marked ``Man. Vac.'' At this point, the vent valve closes against spring tension and seals the passage venting fuel vapors from the float bowl to the canister. When the engine is stopped, the spring opens the valve to again allow venting of the float bowl.

Vent & Purge Valve Type Vapor Canister

This canister is equipped with both a vent valve and a canister purge valve. The rate at which fuel vapor is drawn into the engine is controlled by a Thermal Vacuum Switch (TVS), which supplies

ported vacuum to the purge valve when engine coolant temperature is above a pre-determined value. With engine idling at normal operating temperature, the purge valve is forced closed by spring tension and no purging of the canister occurs. On some models, a small amount of fuel vapor is drawn from the canister through a bleed hole, allowing some canister purge through the PCV system at idle. When the carburetor throttle plates are opened, the signal port located above the throttle plates is uncovered and a ported vacuum signal is applied to the purge valve. Vacuum then overcomes spring tension, opening the valve and allowing vapors to be drawn into the engine for burning.



Evaporative Emission Control Canister: Description and Operation Vapor Storage Canister, Fuel Injected Engines

Fig. 65 Purge valve type canister. 1985-87 4-151 engines w/fuel injection

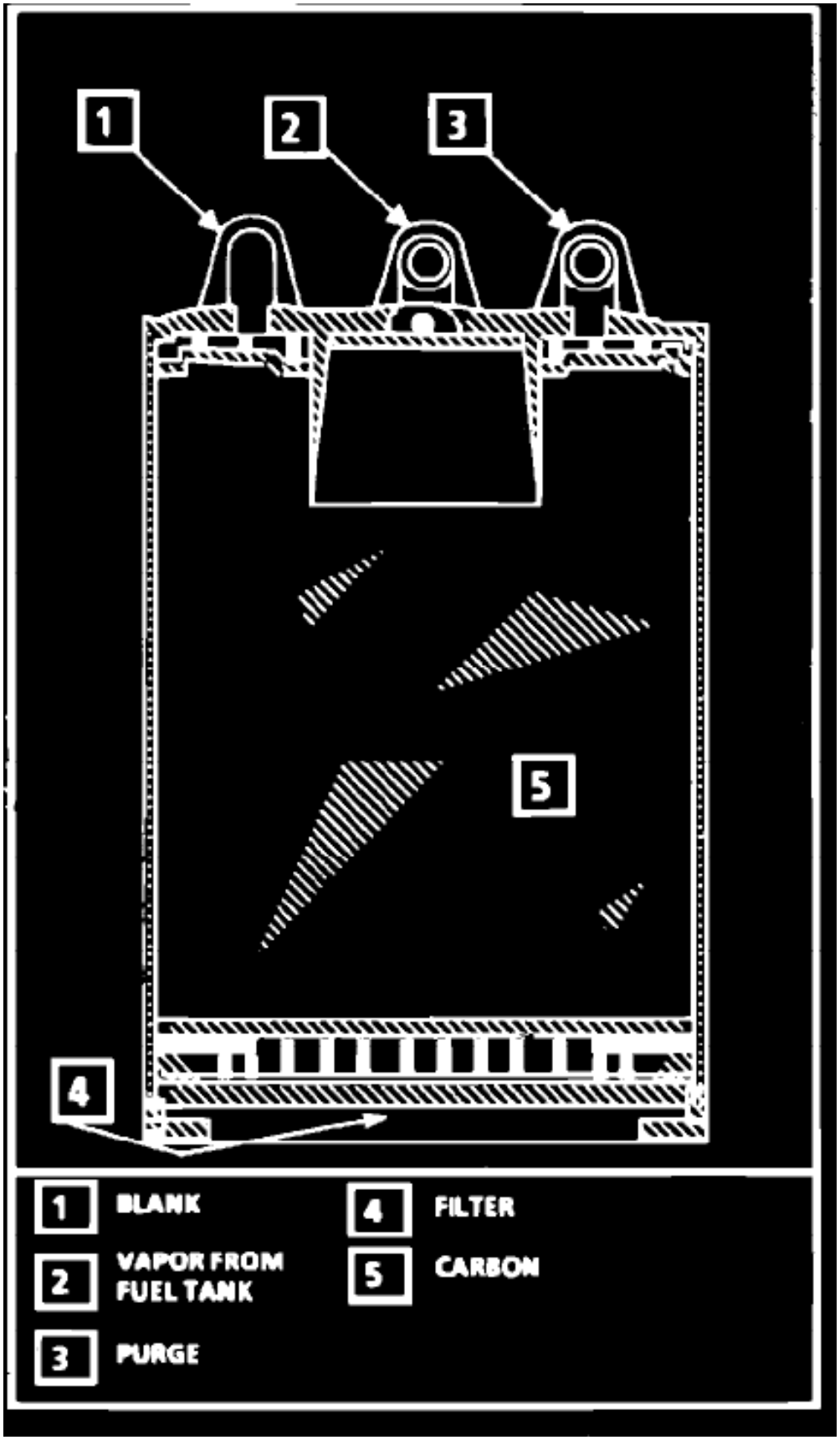
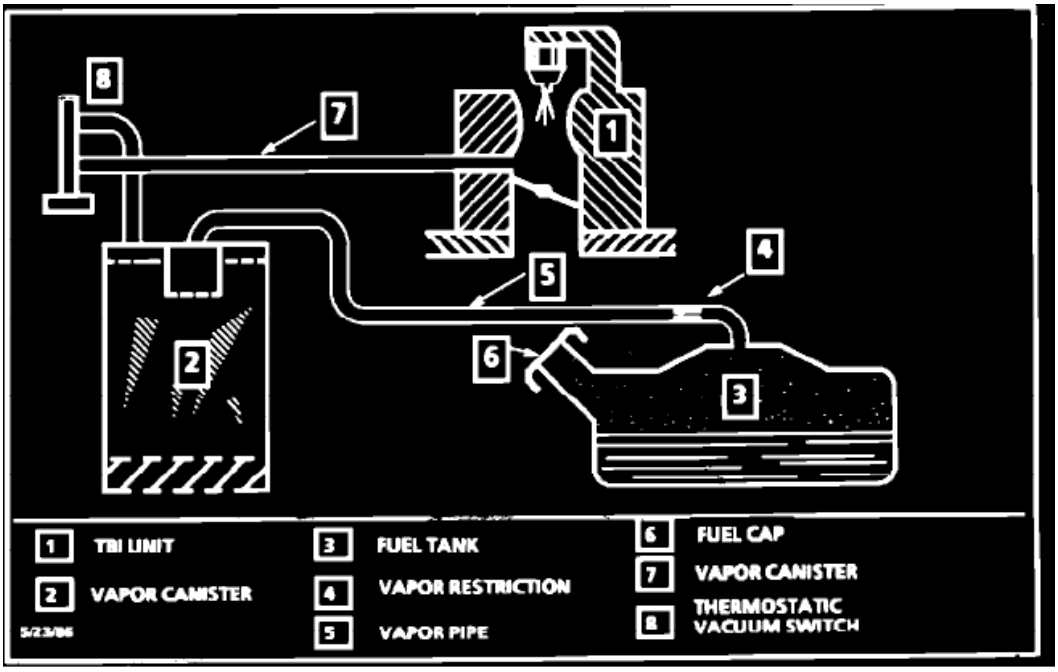


Fig. 66 Charcoal canister. 1987 4-151 & V6-173



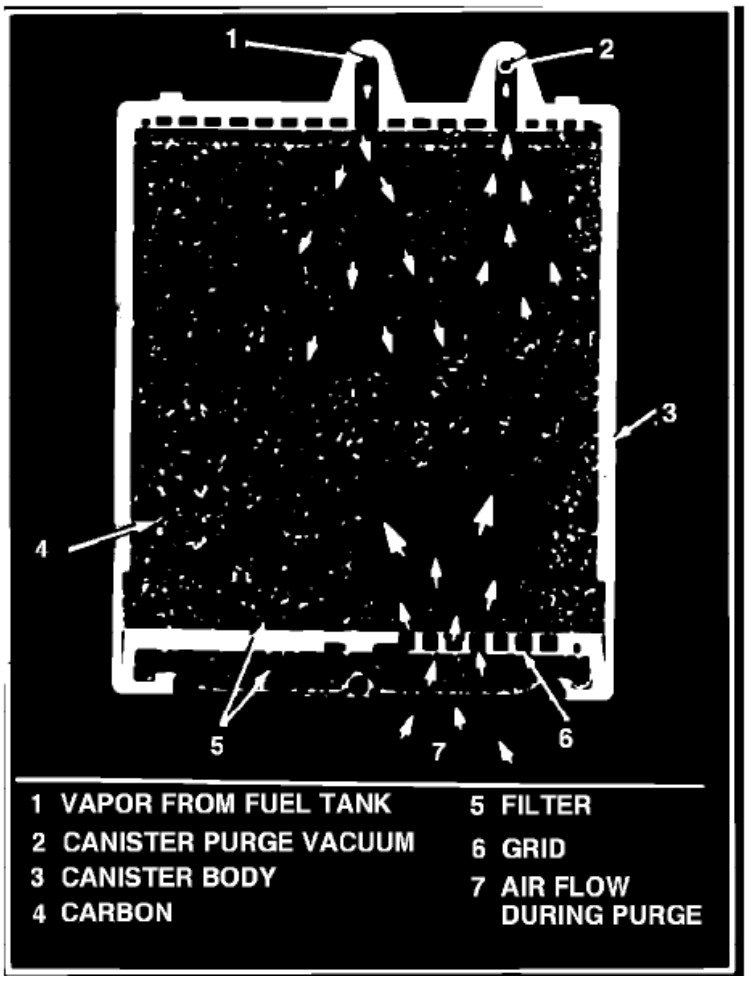


Fig. 67 Evaporative emission control system. 1987 V6-173

Fig. 68 Charcoal canister. 1986 V6-262

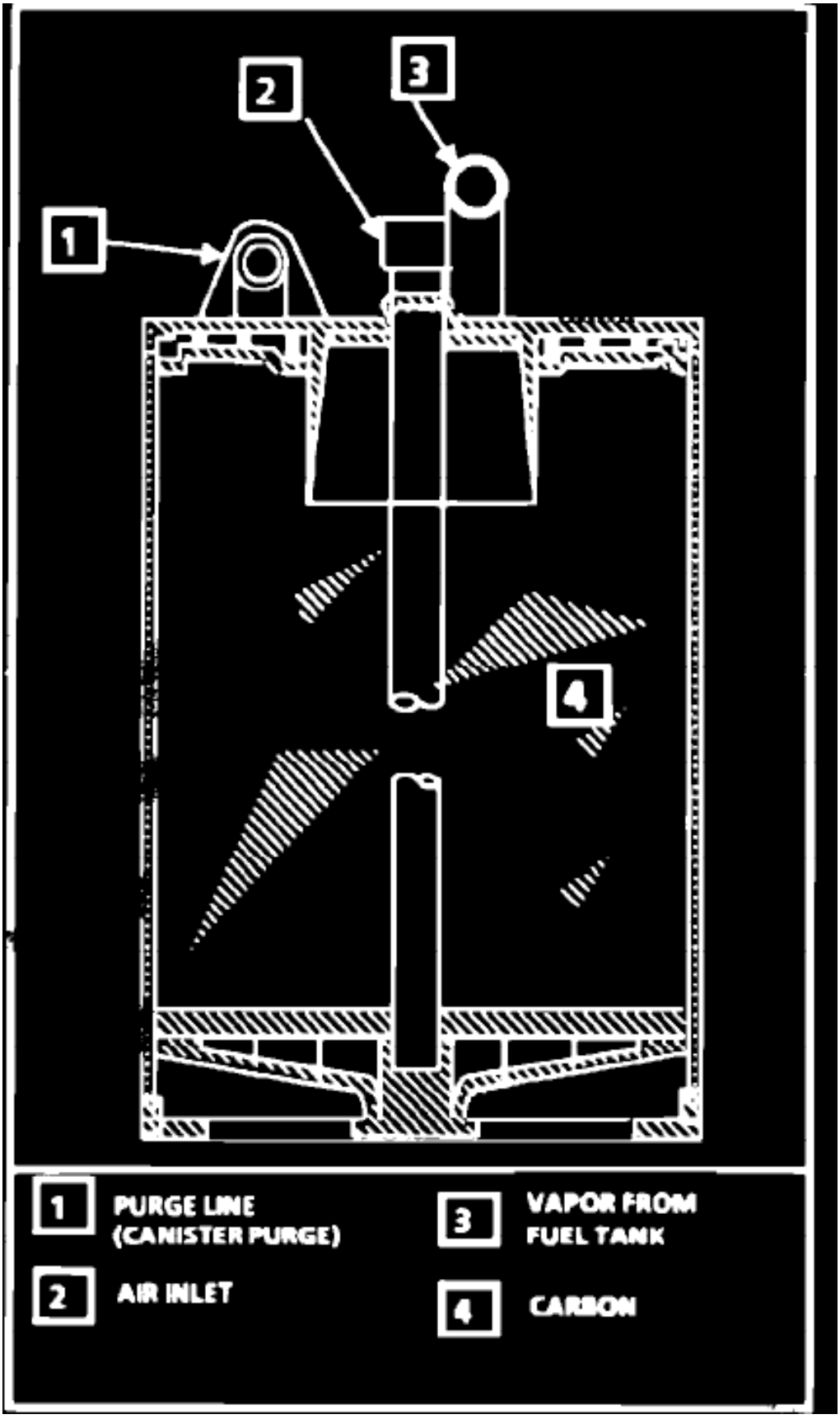


Fig. 69 Charcoal canister. 1987 V6-262, V8-305, 350 & 454 except high altitude

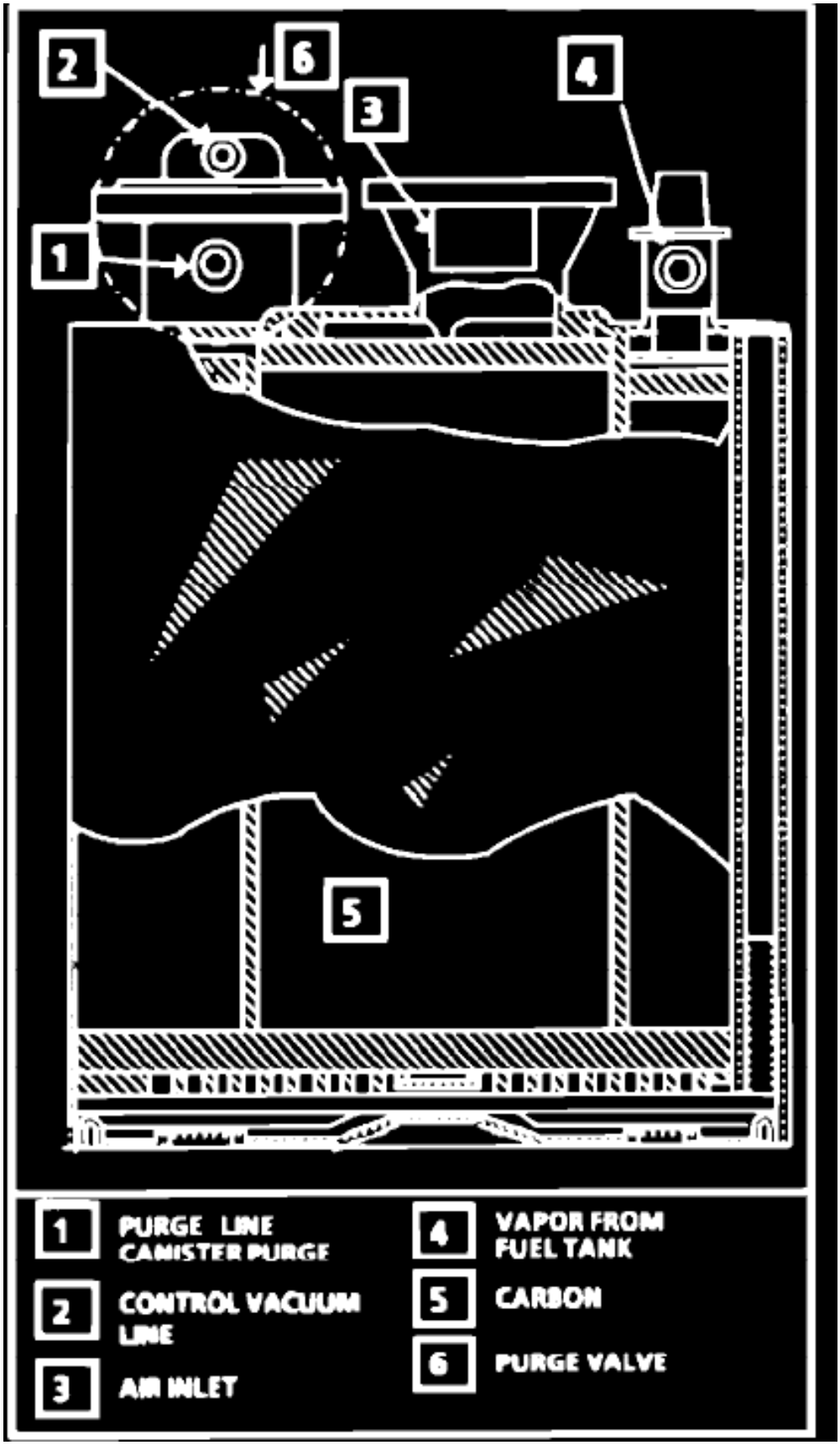


Fig. 70 Charcoal canister. 1987 V6-262, V8-305, 350 & 454 high alt.

These systems Figs. 65 through 70, transfer fuel vapor from the fuel tank to an activated charcoal canister to hold the vapors when vehicle is not running. When engine is running, fuel vapor is purged from the charcoal canister by intake air flow and consumed during normal combustion. The fuel tank has a non-vented fuel cap and a single vent pipe to the canister.

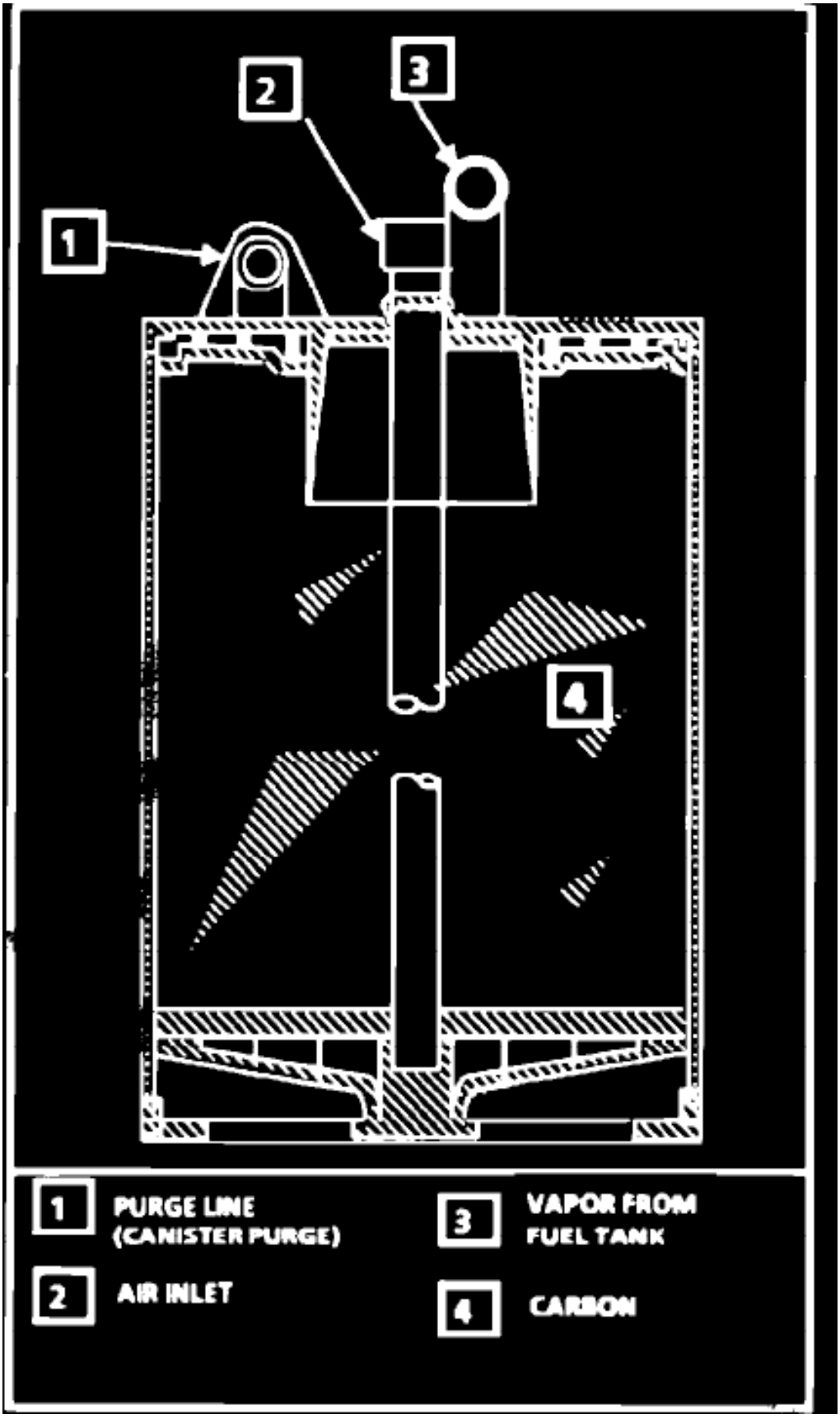


Fig. 69 Charcoal canister. 1987 V6-262, V8-305, 350 & 454 except high altitude

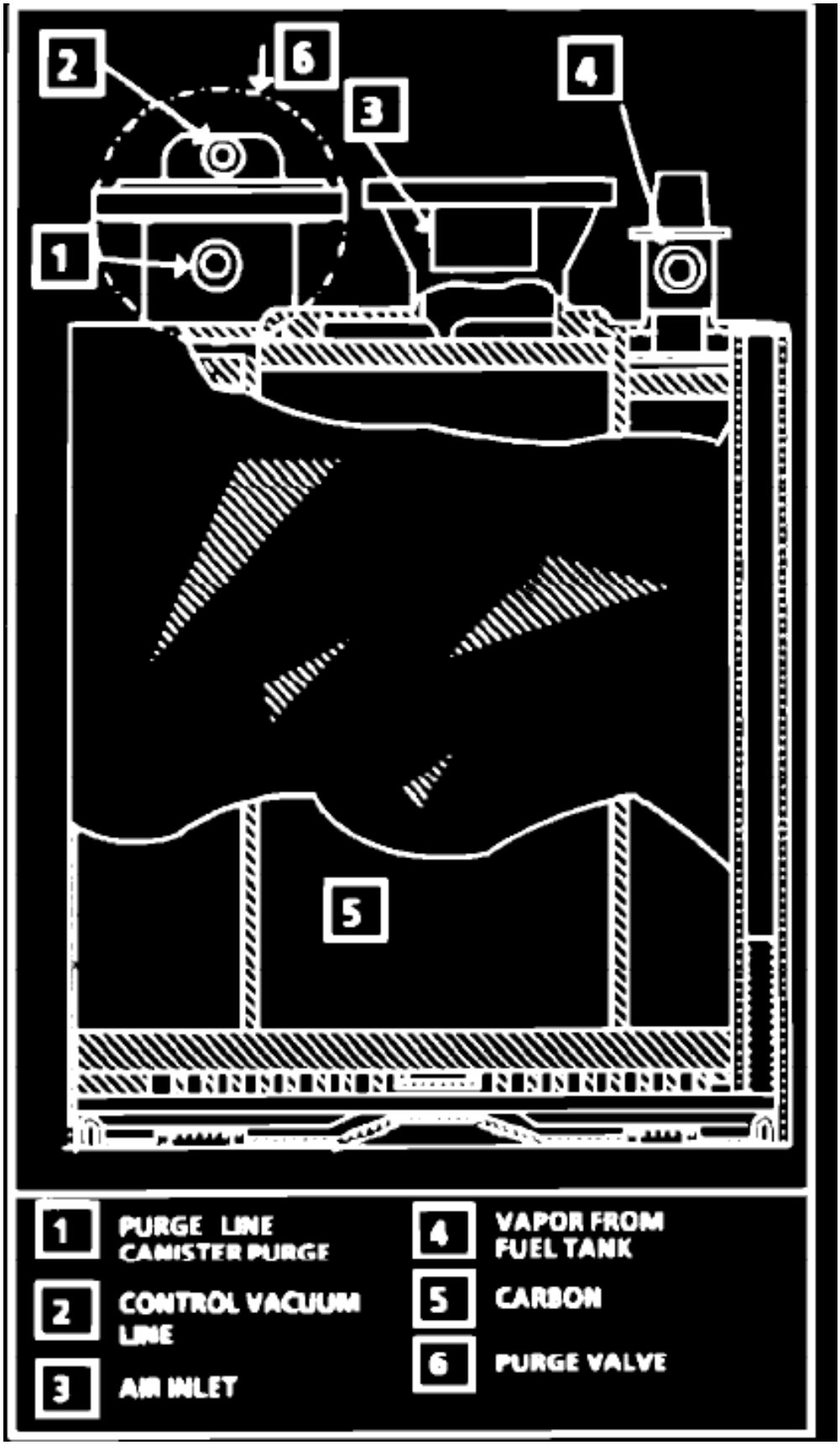


Fig. 70 Charcoal canister. 1987 V6-262, V8-305, 350 & 454 high alt.

1987 V6-262 & V8-305, 350 & 454 Engines On models except high altitude, the canister, Fig. 69, is purged whenever the engine is operating at speeds above idle. A timed vacuum source is applied to the canister vapor tube, drawing fresh air into the canister through the air inlet located at the top of the canister. The fresh air flows through the tube to the bottom of the canister, forcing fuel vapors out through the purge line. On high altitude models, the canister, Fig. 70, incorporates an integral purge valve. When engine is operating, manifold vacuum is applied to the purge valve through the top tube, while timed port vacuum from the TBI throttle body is applied to the purge valve through the lower tube. The manifold vacuum is used to lift the purge valve diaphragm, opening the valve, while the timed port vacuum from the TBI throttle body is used to control the rate of purge. During purge conditions, fresh air is drawn in through the air inlet at the top of the canister. The fresh air flows through the tube to the bottom of the canister, forcing fuel vapors out through the purge line.

Evaporative Emission Control Canister: Description and Operation Vapor Storage Canister

Canister Purge Thermal Vacuum Switch (CP-TVS)

When coolant temperatures are below the switching point, canister purge is controlled by the internal orifice within the switch. However, when coolant temperature is above the switching point, the switch opens and permits canister purge to be controlled by manifold vacuum from the carburetor port.

EGR Canister Purge Thermal Vacuum Switch (EGR-CP-TVS)

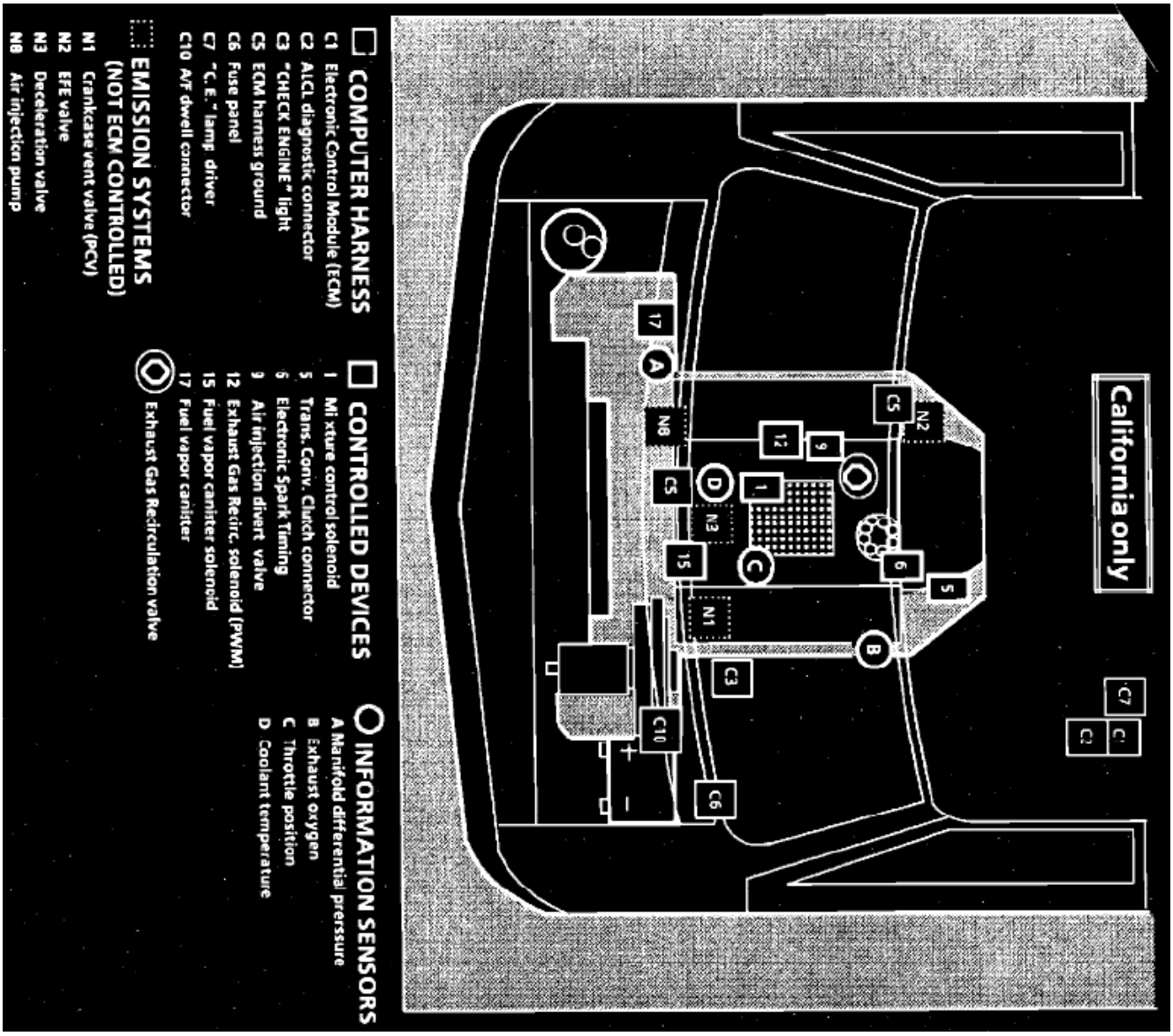
When engine coolant temperature is below the calibration point of the switch, ported vacuum is blocked from the canister and the EGR valve. Above the switching point, ported vacuum is directed to both the canister purge port and the EGR valve.

Thermal Vacuum Valve - EVAP: Testing and Inspection Canister Purge Thermal Vacuum Switch (CP-TVS)

With engine coolant temperature below the calibration point, connect a vacuum gauge to upper port and a vacuum pump to lower port. Apply vacuum, then disconnect pump. The gauge should indicate that the vacuum is slowly bleeding off. Replace valve if operation is not as specified. Make some connections as ``Cold Check'', then with engine coolant temperature above the calibration point, apply vacuum. Vacuum gauge reading should be the same as that applied with vacuum pump. Disconnect vacuum pump from valve. The vacuum reading on the gauge should drop to zero immediately. Replace valve if operation is not as specified.

Thermal Vacuum Valve - EVAP: Testing and Inspection EGR Canister Purge Thermal Vacuum Switch (EGR-CP-TVS)

Below the switching point, Ports 1 and 2 should be blocked and no ported vacuum should be directed to the canister and EGR valve. Above the switching point, Ports 1 and 2 should be open, allowing ported vacuum to be directed to the canister and EGR valve. Replace valve, if defective.



EGR Control Solenoid: Locations

Underhood & Engine Components.

Top RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

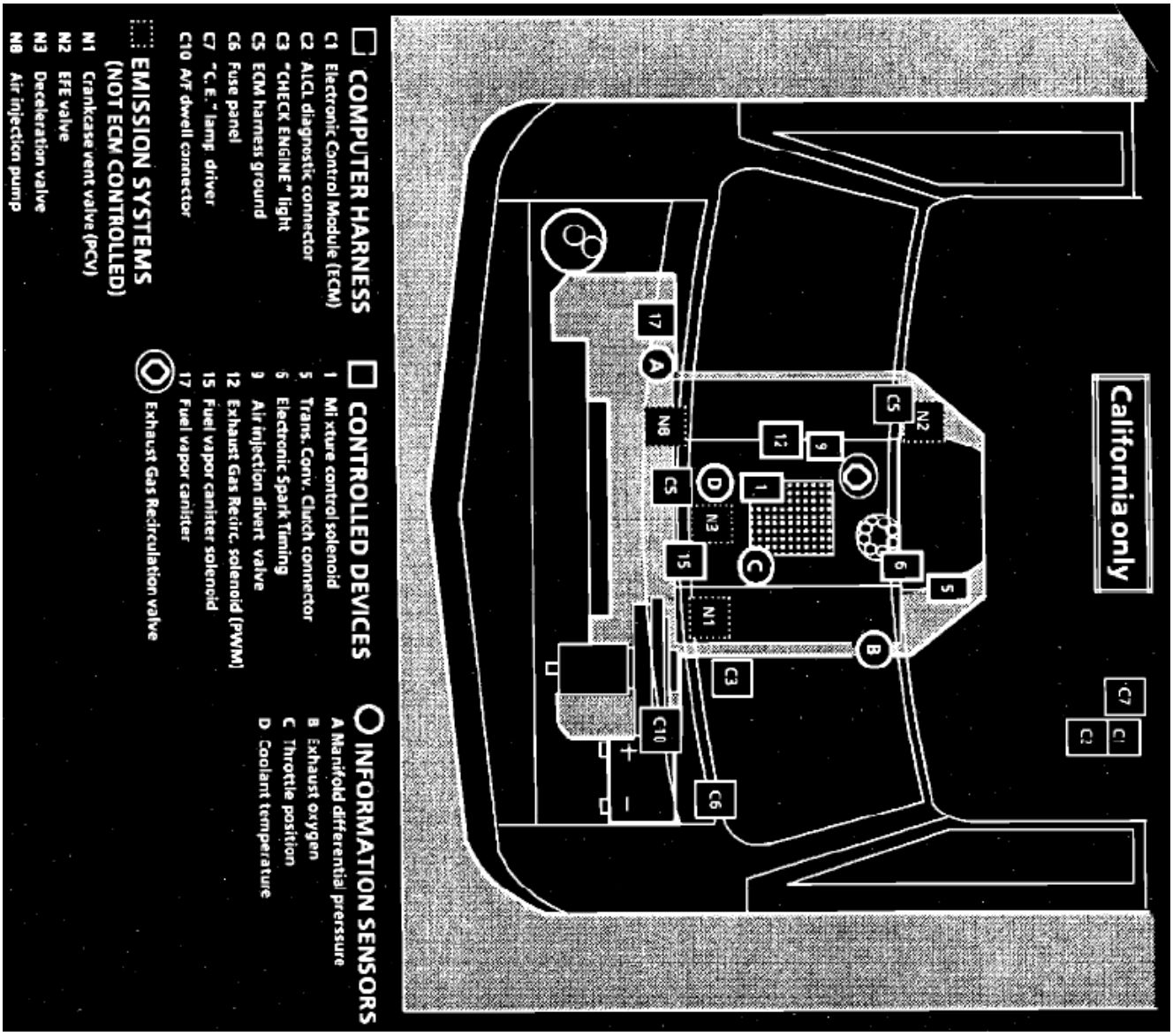
EGR Control Solenoid: Description and Operation

The ECM controls vacuum to the EGR valve electronically--through the EGR bleed solenoid. -

When the engine is warm the solenoid is de-energized allowing vacuum to the EGR valve.

- When the engine is cold the solenoid is energized blocking vacuum to the EGR valve.

- The solenoid also decreases the amount of vacuum to the EGR valve when the torque converter clutch is engaged.

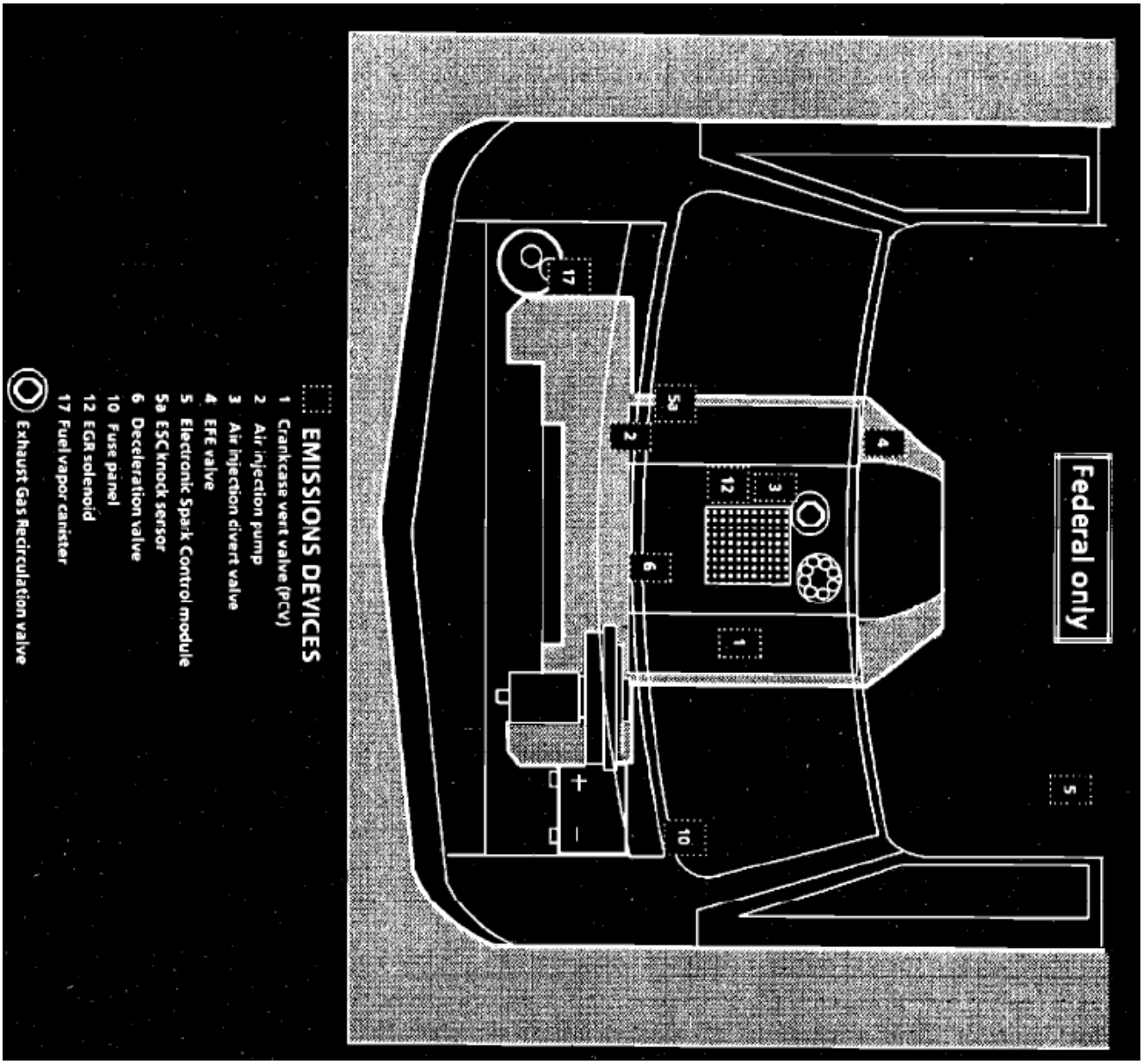


EGR Valve: Locations California

Underhood & Engine Components.

RH Side Rear Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

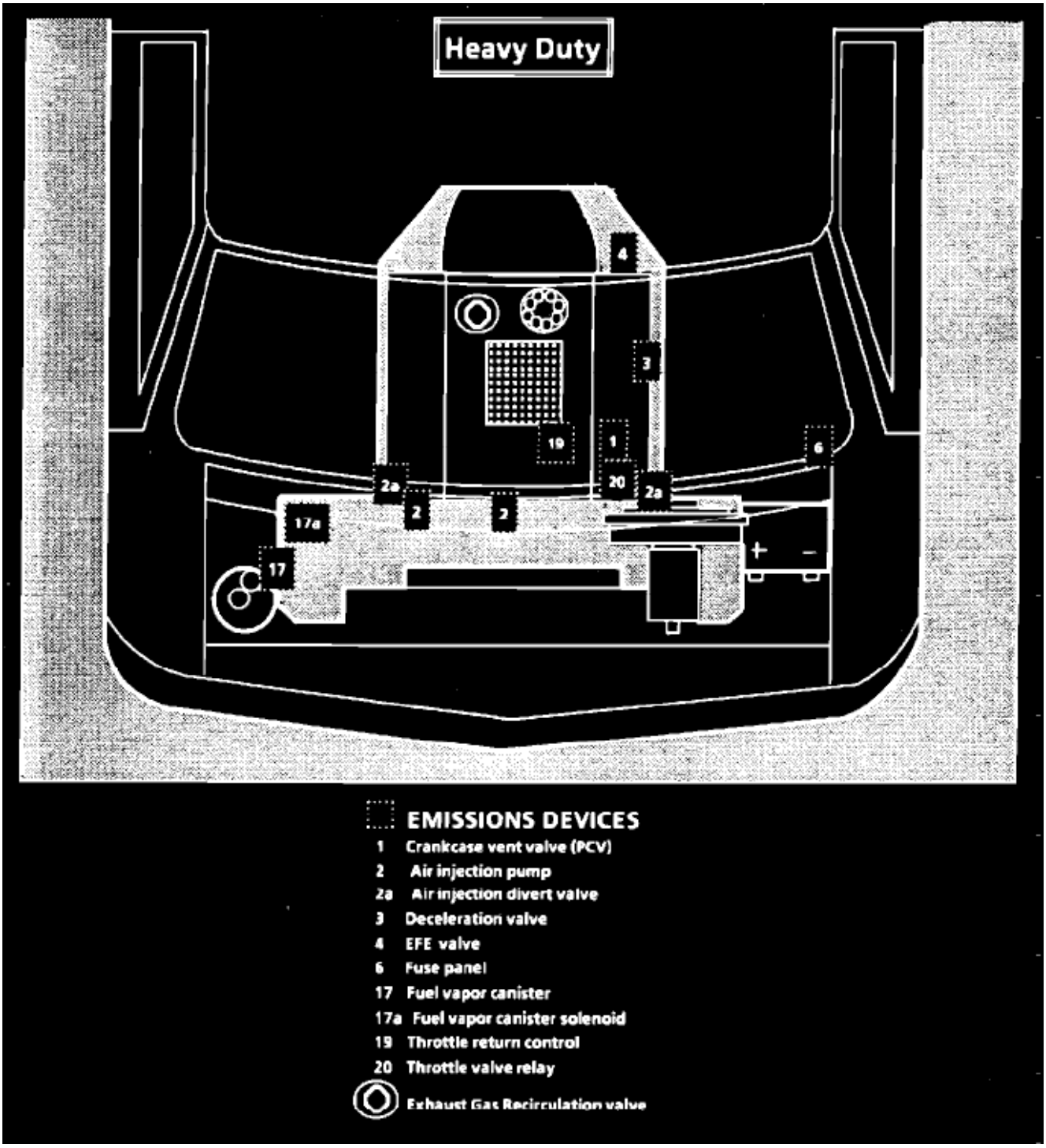


EGR Valve: Locations Except California

Underhood & Engine Components.

RH Rear Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



EGR Valve: Locations Heavy Duty Emissions

Underhood & Engine Components

RH Rear Top Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

EGR Valve: Testing and Inspection Negative Back Pressure EGR Valve

1. Check valve signal tube orifice for obstructions, then connect a suitable vacuum gauge between valve and carburetor.

2. Bring engine to normal operating temperature and run at approximately 3000 RPM. Gauge should read approximately 5 inches Hg.

3. Depress valve diaphragm and place finger over source tube.

4. Release diaphragm and check seat for movement.

5. If valve takes less than 20 seconds to move to the seated position, replace the valve.

6. If the EGR valve functions properly, check the EGR-TVS.

EGR Valve: Testing and Inspection Ported Vacuum EGR Valve

1. Place finger under EGR valve and push on diaphragm plate. Diaphragm should move freely from open to closed position. If it does not move freely, replace valve. Do not touch the valve when engine is hot.

2. Connect a vacuum gauge between EGR signal tube and vacuum hose.

3. With transmission in Park or Neutral and engine running, open throttle to obtain 5 inches Hg at EGR valve.

4. Remove vacuum hose from EGR signal tube and check for diaphragm plate to move downward (valve closed). If diaphragm does not move, increase engine speed. If diaphragm still does not move, replace EGR valve.

5. Connect vacuum hose and check for diaphragm plate to move upward (valve open). If diaphragm does not move increase engine speed. If diaphragm still does not move, replace EGR valve. A vibration of the diaphragm plate may be noticed. This does not indicate a bad valve or require correction.

EGR Valve: Testing and Inspection Positive Back Pressure EGR Valve

1. Check valve signal tube orifice for obstructions. On engines with an EGR-TVS, there should be no EGR valve movement below 85° F. If there is movement, check the EGR-TVS for proper operation.

2. Remove EGR valve from vehicle. Then apply a constant external vacuum supply, approximately 10 inches Hg or more, to the EGR vacuum signal tube.

3. EGR valve should not be open. If valve is open, the transducer control valve is stuck closed and EGR valve must be replaced.

4. With vacuum supply still being applied, direct a stream of air from a low pressure source, 15 PSI, into the valve exhaust gas intake.

5. EGR valve should open completely. If valve does not open, the transducer control valve is stuck open and EGR valve must be replaced.

EGR Valve: Service and Repair

REMOVE OR DISCONNECT

1. Air cleaner. 2. EGR valve vacuum hose at valve. 3. Bolts. 4. EGR valve and gasket from manifold, discard gasket.

INSPECTION

If the EGR passage indicates excessive build up of deposits, the passage should be cleaned. Care should be taken to ensure that all loose particles are completely removed to prevent them from clogging the EGR valve of from being ingested into the engine.

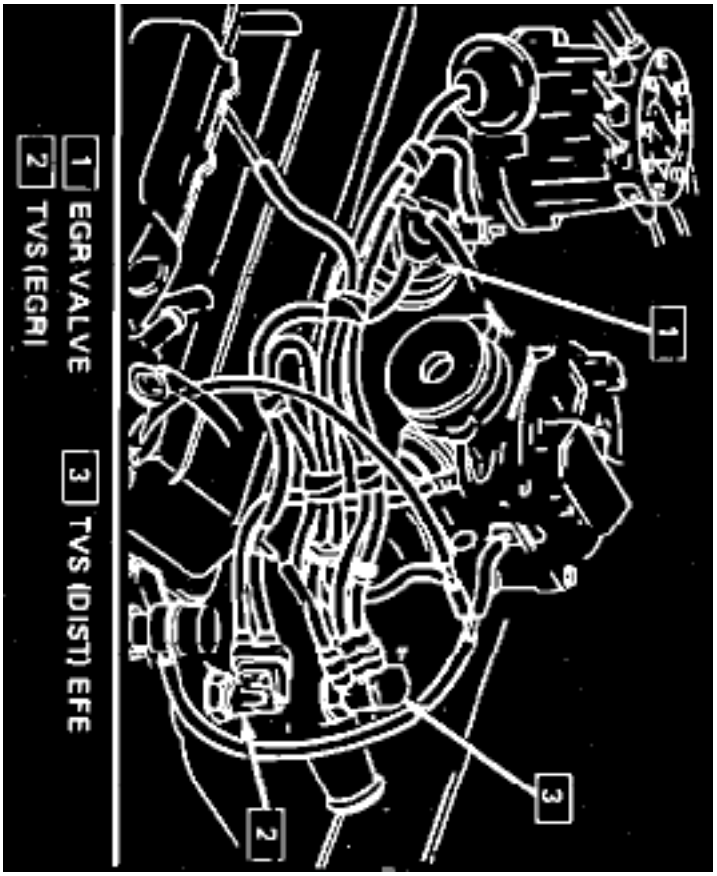
CLEANING

1. With a wire wheel, buff the exhaust deposits from the mounting surface and around the valve. 2. Look for exhaust deposits in the valve outlet. Remove deposit build up with a screwdriver. 3. Clean the mounting surfaces of the intake manifold and valve assembly.

CAUTION: DO NOT wash the EGR valve in solvents or degreaser as permanent damage to the valve diaphragm may result. Also, sand blasting of the valve is not recommended since this can affect the operation of the valve.

INSTALL OR CONNECT

1. New EGR gasket. 2. EGR valve onto manifold. 3. Bolts. 4. Vacuum tube to EGR valve. 5. Air cleaner assembly. 6. Check operation of EGR system to ensure correct operation.



Thermal Vacuum Valve: Locations

Top Of Engine.

Front Top Of Engine

Applicable to: 1985 5.0L & 5.7L

Thermal Vacuum Valve: Testing and Inspection

1. Drain coolant, as needed, until coolant level is below valve.

2. Note inlet and outlet ports, disconnect vacuum hoses and remove valve from engine.

3. Connect suitable vacuum gauge to valve outlet and vacuum source to valve inlet.

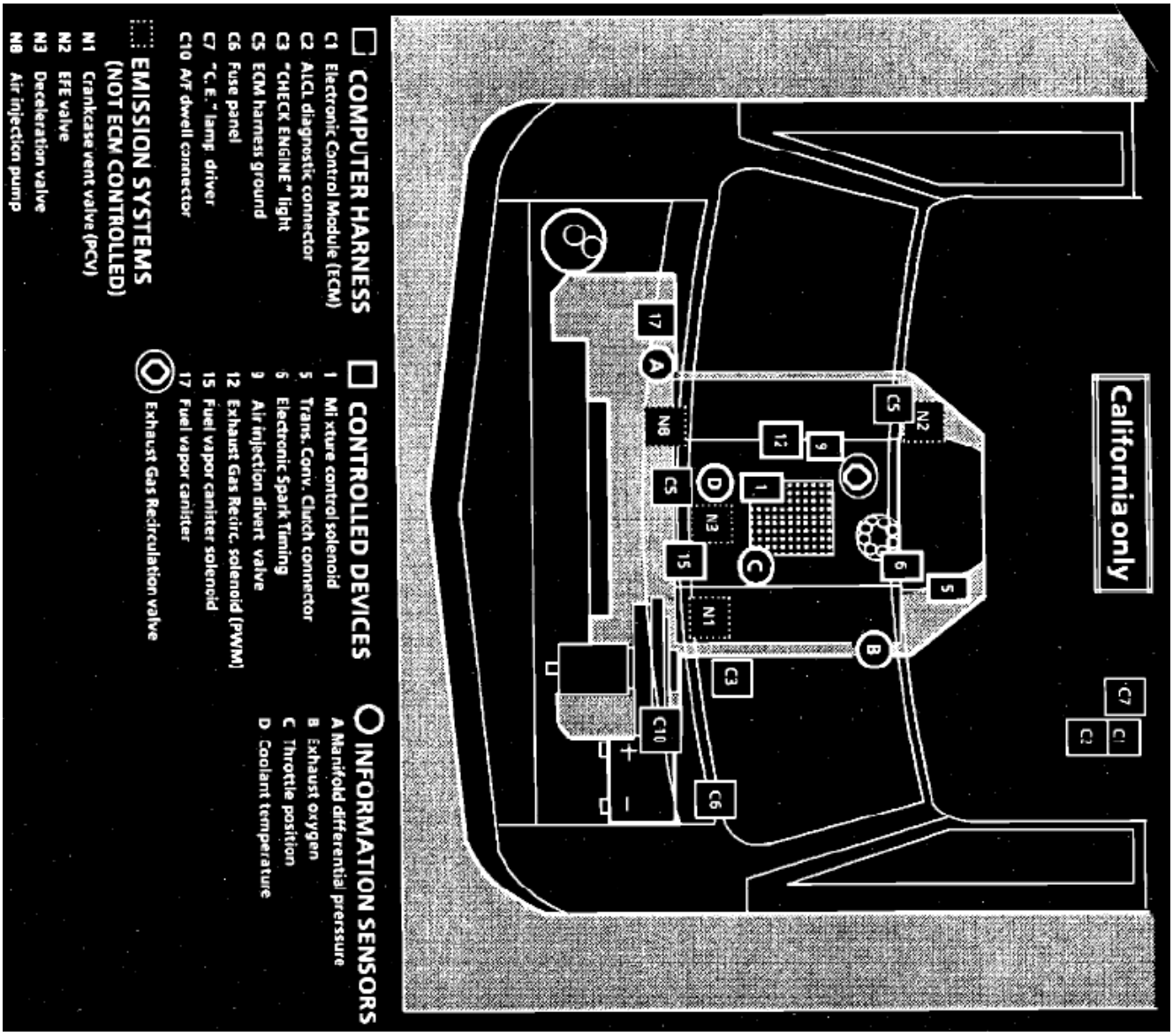
4. Cool valve to a temperature at least 10°F. below calibration value stamped on valve and apply at least 12 inches Hg vacuum to valve inlet.

5. Valve should be closed and vacuum gauge on outlet should read zero. Leakage of up to 2 inches Hg vacuum in 2 minutes is allowable and does not mean valve is defective.

6. Leave vacuum applied to valve and slowly warm valve in a pan of water while observing water temperature and vacuum gauges.

7. When valve reaches calibration temperature (stamped on valve), vacuum passage should open and gauge on outlet should indicate vacuum equal to applied vacuum at inlet.

8. If TVV or TVS fails to perform as outlined it should be replaced.

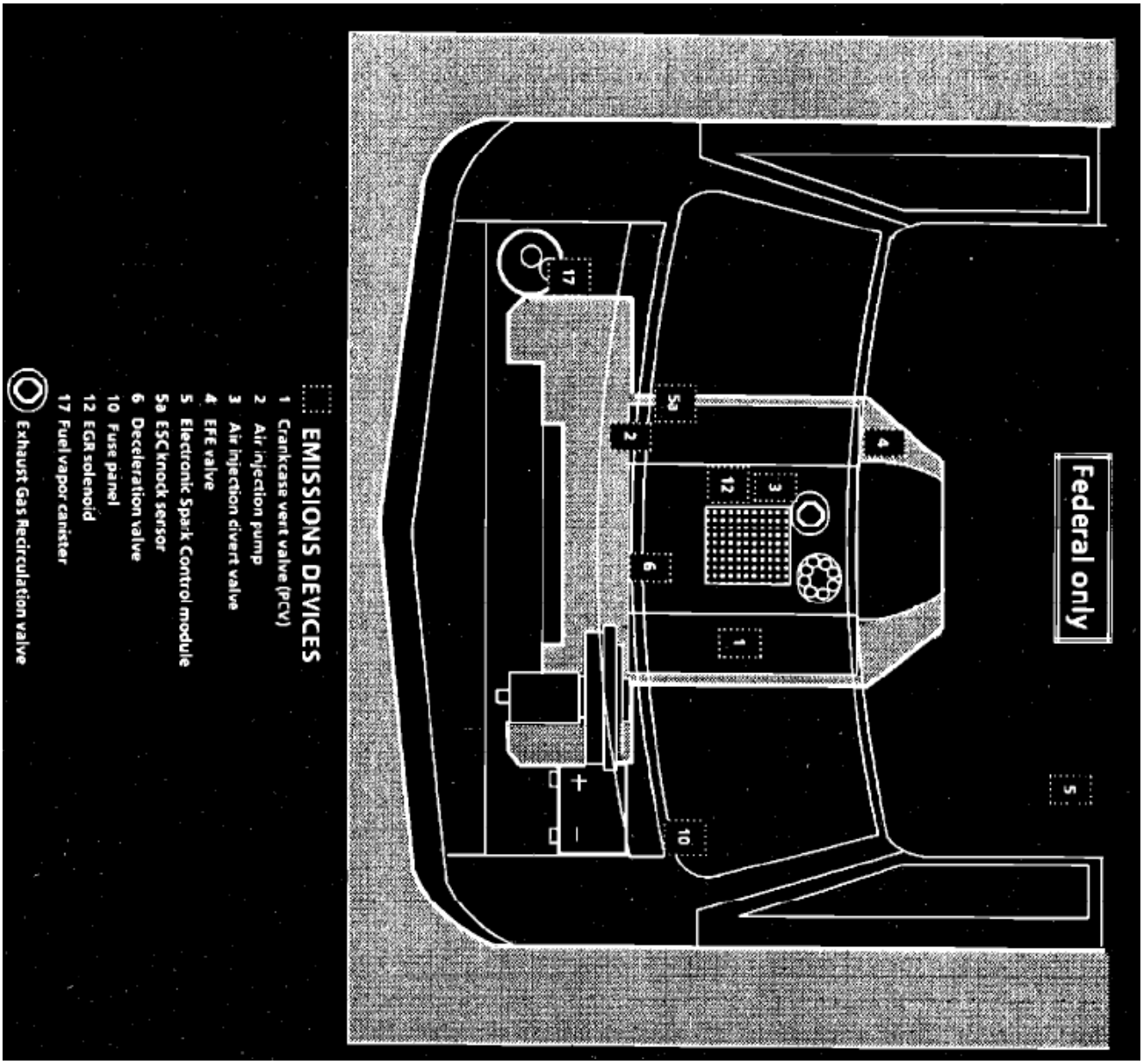


Crankcase Vent: Locations California

Underhood & Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California

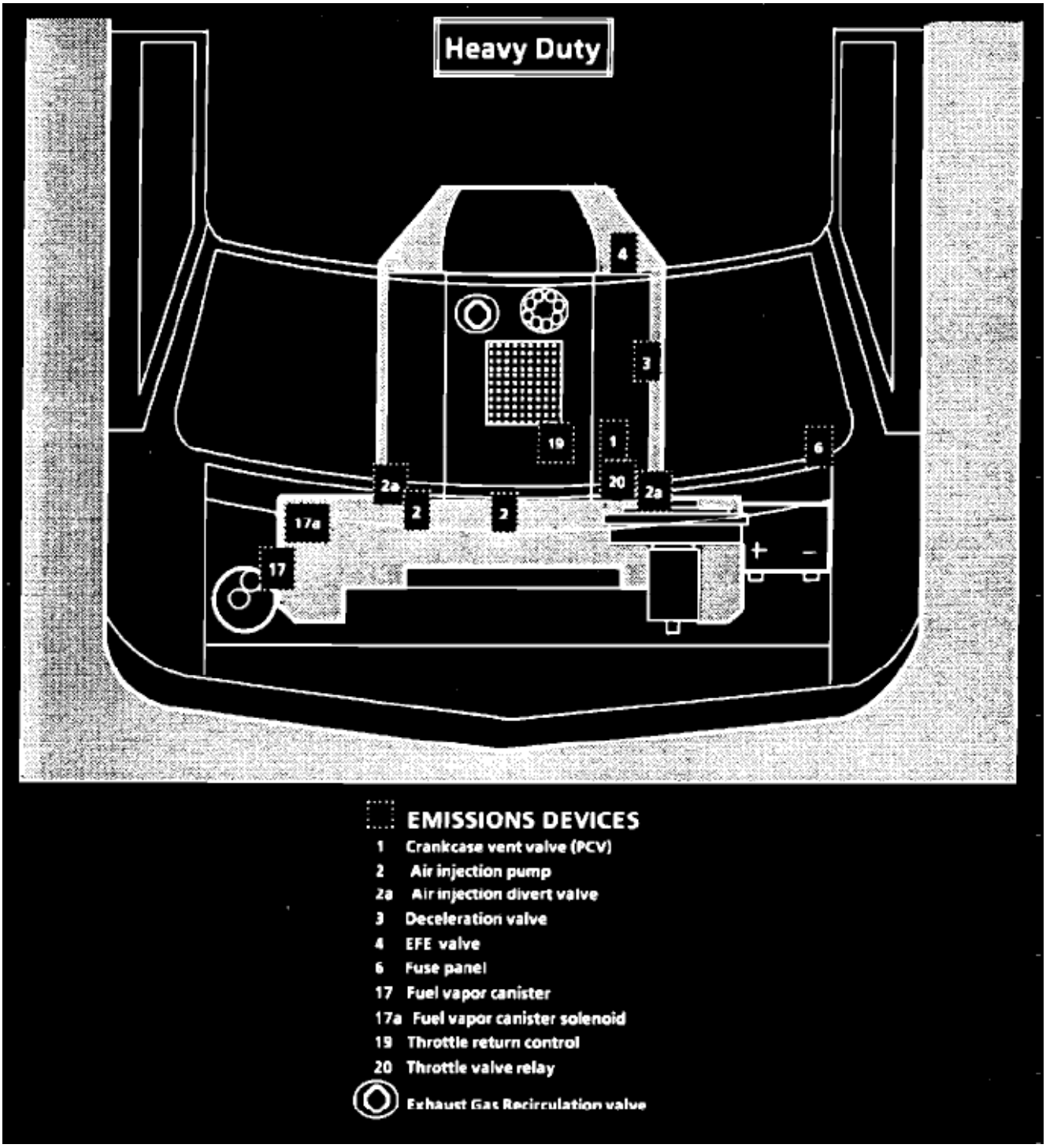


Crankcase Vent: Locations Except California

Underhood & Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Crankcase Vent: Locations Heavy Duty Emissions

Underhood & Engine Components

LH Side Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

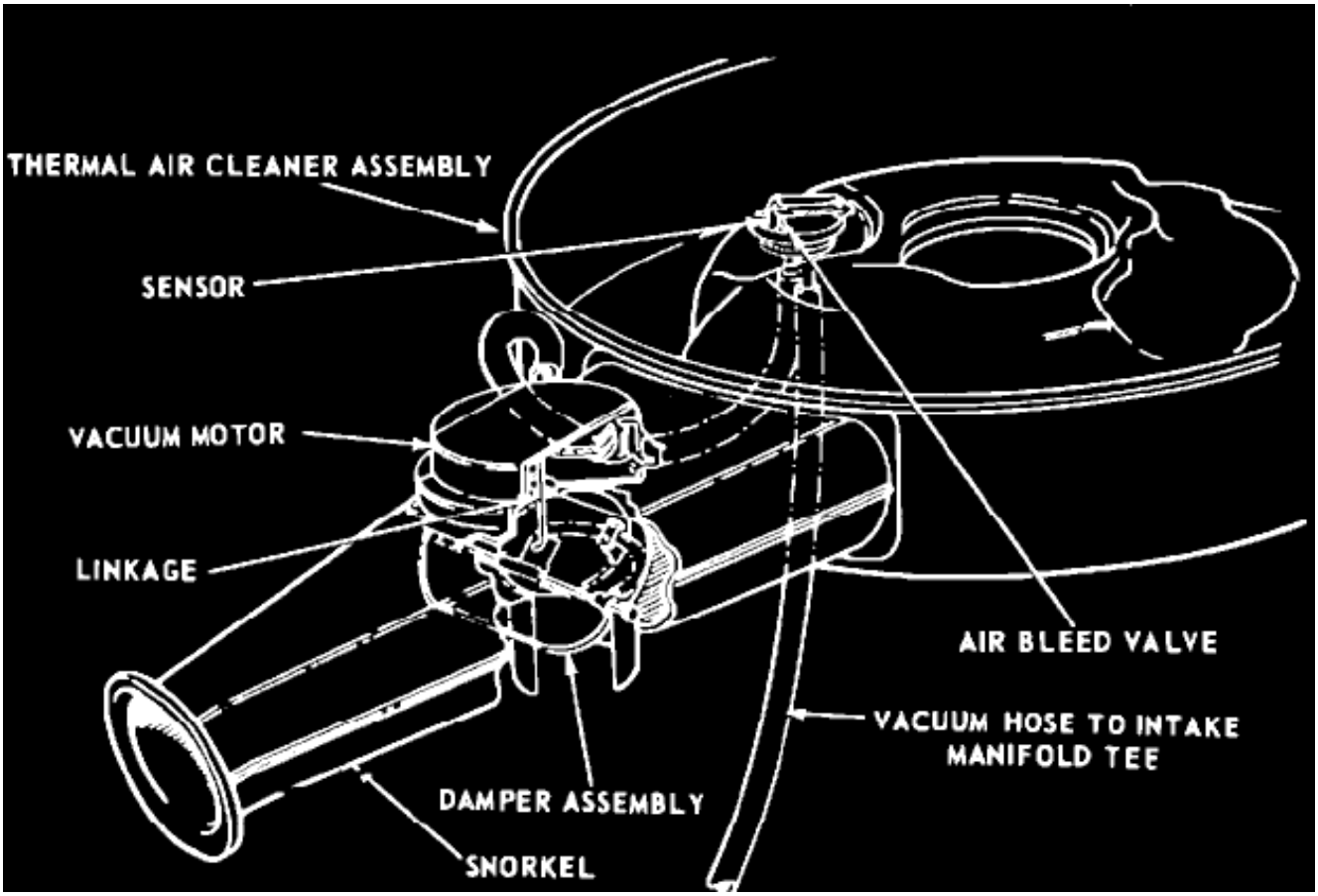
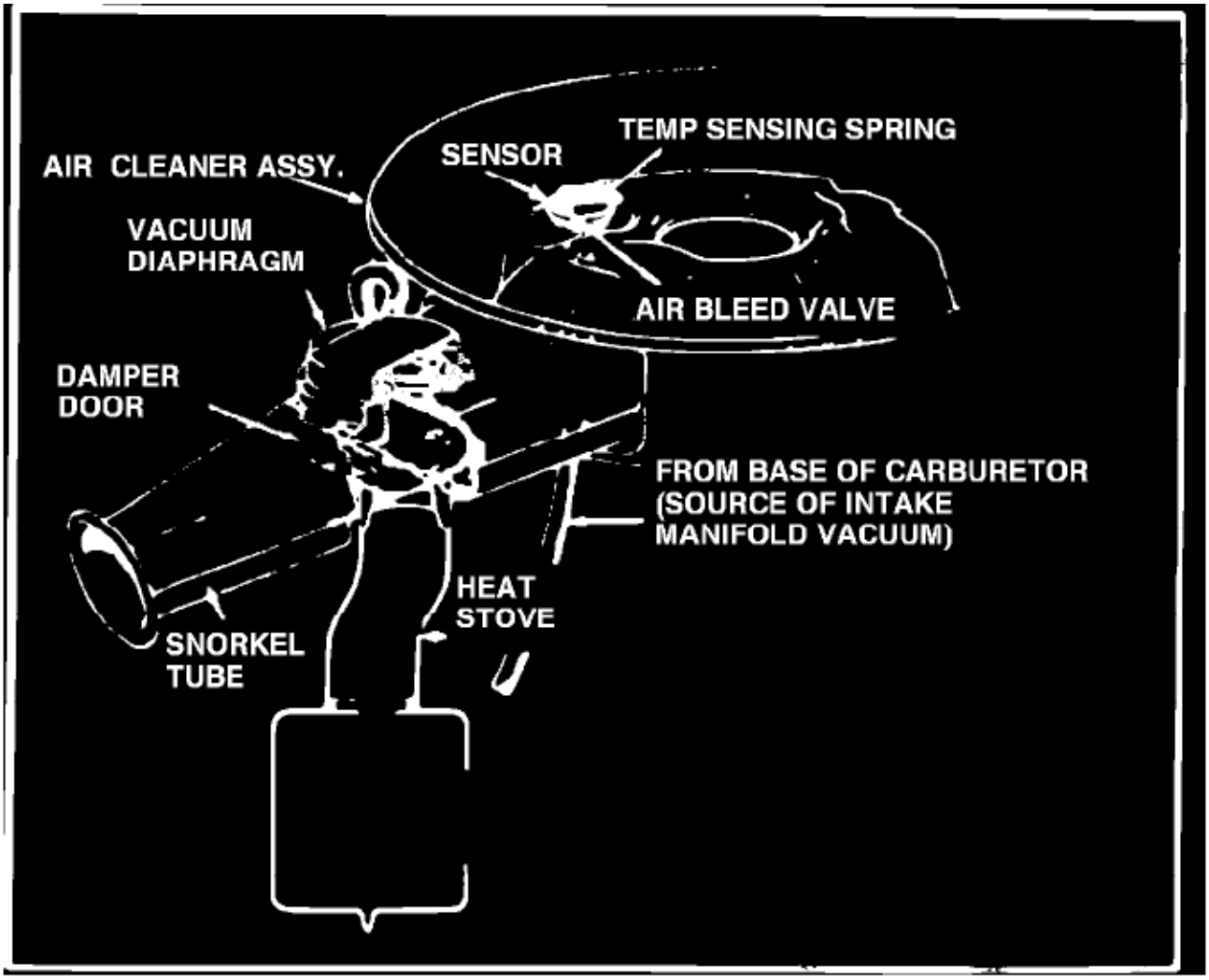
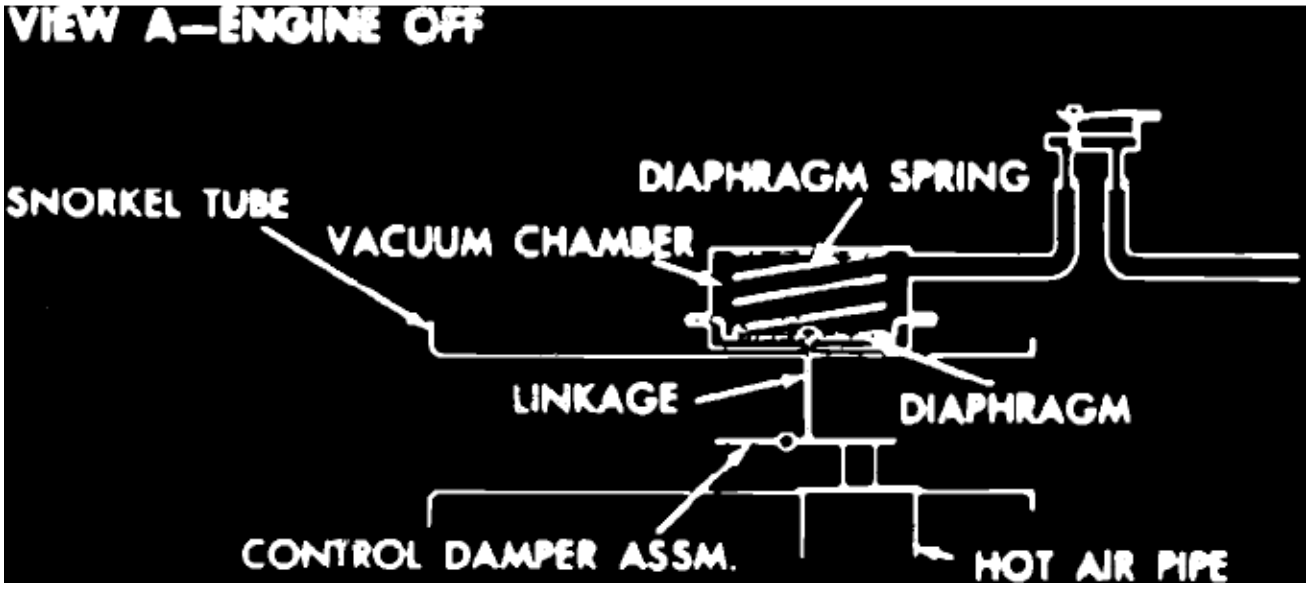


Fig. 2 Typical Thermostatic Air Cleaner Assembly

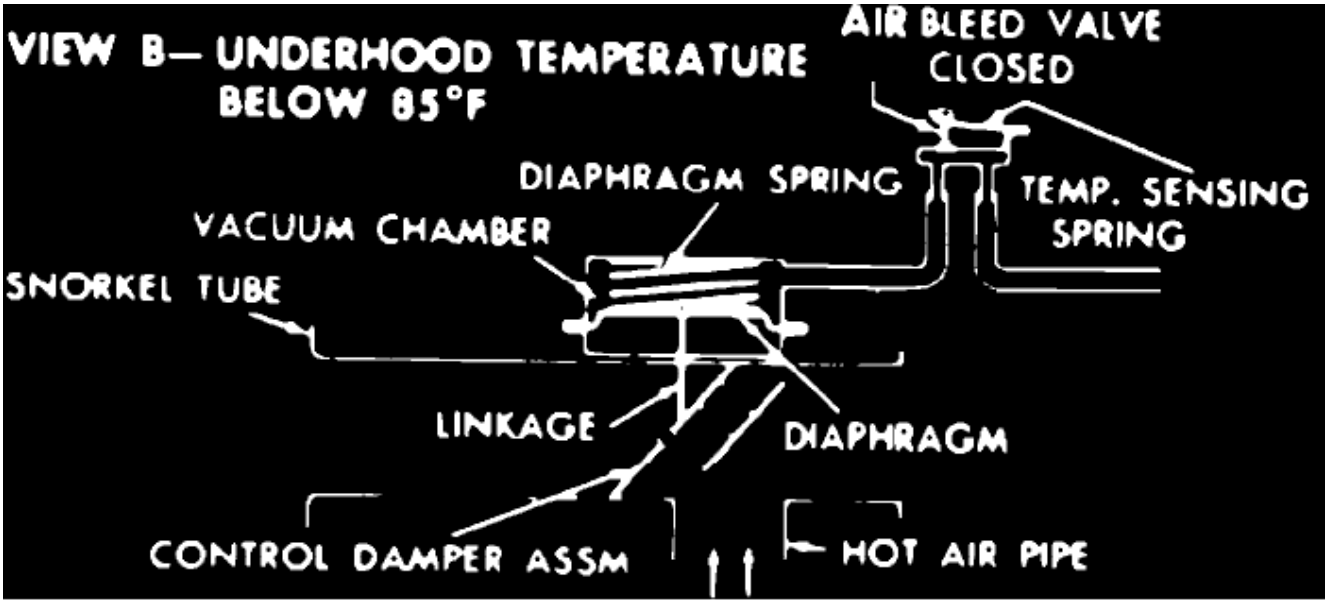

AIR CLEANER ASSY.
SENSOR
TEMP SENSING SPRING
VACUUM DIAPHRAGM
AIR BLEED VALVE
DAMPER DOOR
FROM BASE OF CARBURETOR (SOURCE OF INTAKE MANIFOLD VACUUM)
HEAT STOVE
SNORKEL TUBE


VIEW A—ENGINE OFF
SNORKEL TUBE
VACUUM CHAMBER
DIAPHRAGM SPRING
LINKAGE
DIAPHRAGM
CONTROL DAMPER ASSM.
HOT AIR PIPE

Thermostatic Air Cleaner: Description and Operation

Fig. 82 Typical Thermostatically Controlled Air Cleaner (TAC)

Fig. 83 TAC air door operation. Engine off



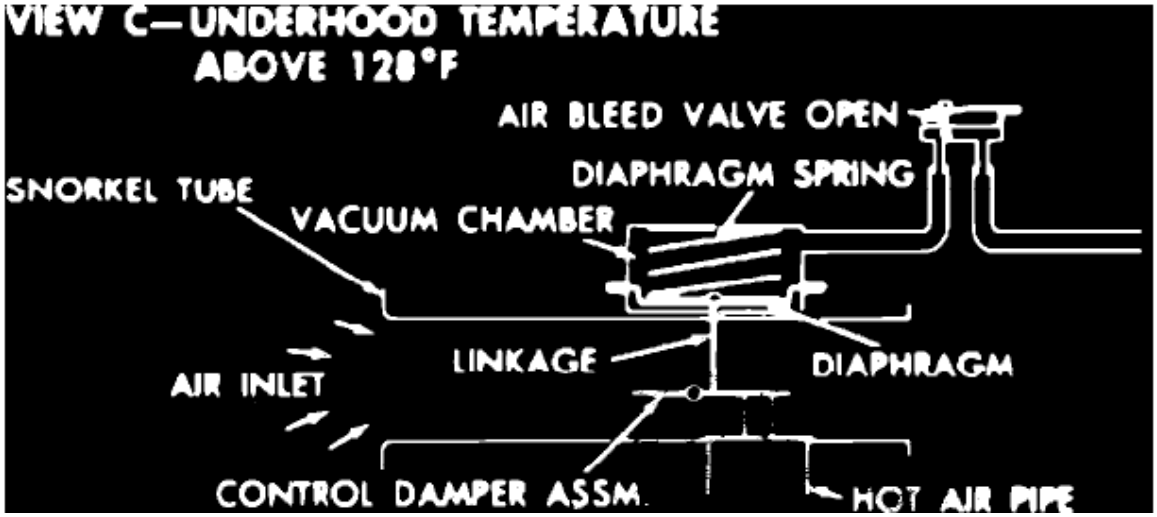
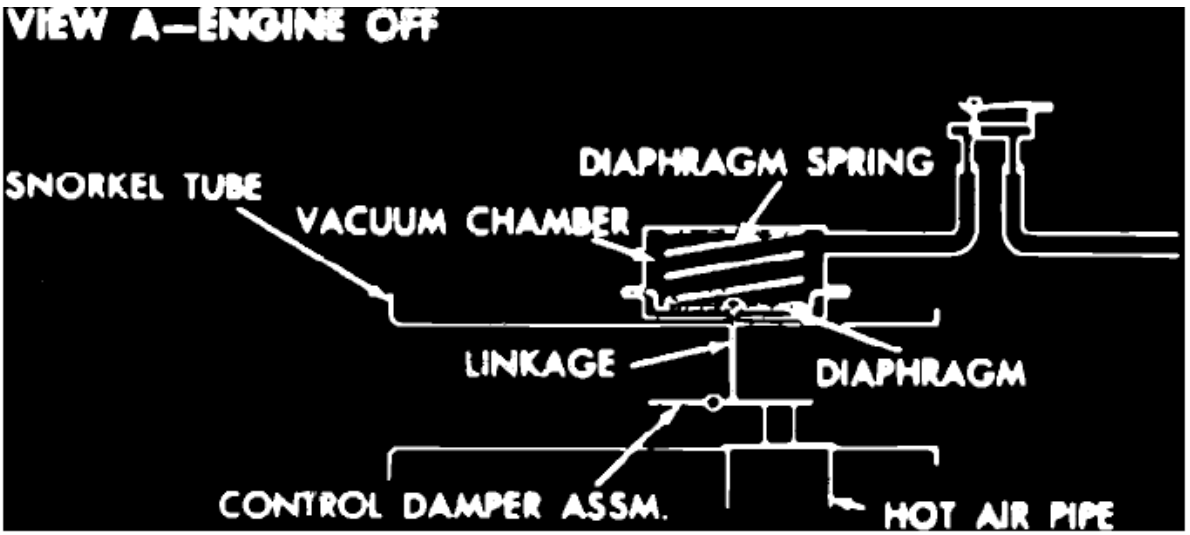


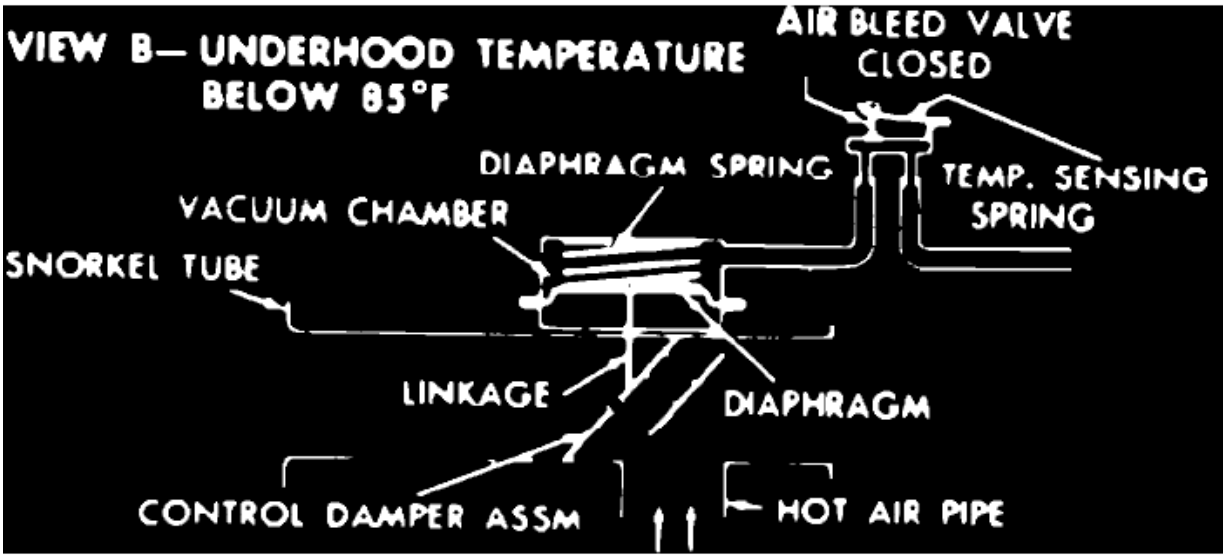
Fig. 84 TAC operation. Engine running, temperature below 85 F

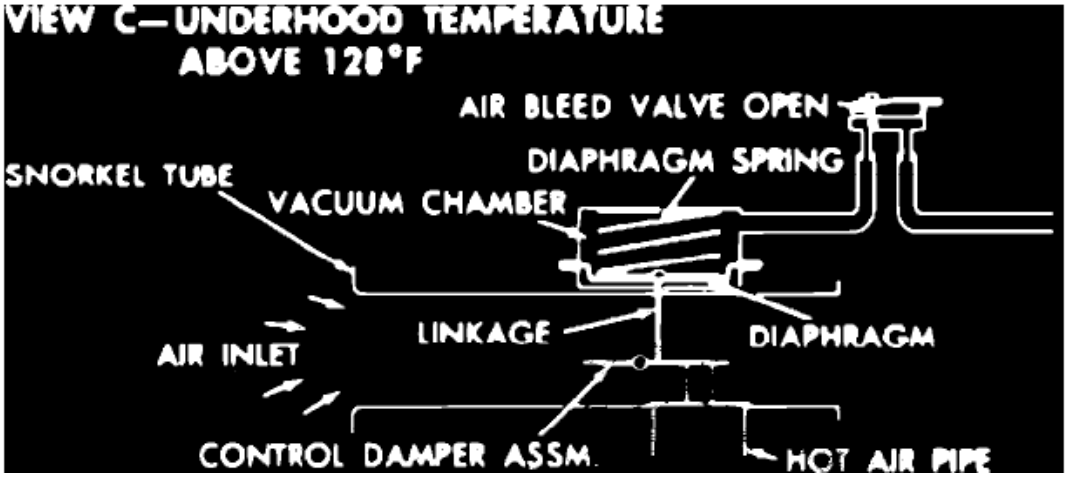
Fig. 85 TAC operation. Engine running, temperature above 128 F

The TAC system, Fig. 82, is designed to improve carburetor operation and engine warm-up conditions. It achieves this by keeping the air entering the carburetor at a temperature of at least 100° F., or more. Carburetor air temperature is controlled by a pair of doors, Figs. 83 thru 85, located in the air cleaner snorkel, which channel either preheated or under hood air to the carburetor. Preheated air is obtained by passing under hood air through ducts surrounding the exhaust manifold, causing it to pick up heat from the manifold surface. The heated air is then drawn up through a pipe to the air cleaner snorkel. Underhood air is picked up at the air cleaner snorkel in the conventional manner. The two air mixing doors work together so that as one opens, the other closes and vice versa. When underhood temperature is below approximately 86 ° F., the cold air door closes, causing the hot air door to open. Hot air from the exhaust manifold stove is then drawn

into the carburetor. As the underhood temperature increases, the cold air door begins to open until the temperature reaches approximately 115° to 130° F, at which time the cold air door is fully open and the hot air door is fully closed. The doors are controlled by a vacuum motor mounted on the air cleaner snorkel. This motor, in turn, is controlled by a sensor inside the air cleaner which regulates the amount of vacuum present in the vacuum motor according to air cleaner temperature. Whenever manifold vacuum drops below 5---8 inches, depending on the unit, the diaphragm spring in the motor will open the cold air door wide in order to provide maximum air flow. The vacuum motor and control door assembly in the left snorkel on outside air induction units does not have a sensor and is controlled only by manifold vacuum. This snorkel remains closed until full throttle is obtained. With manifold vacuum at 6-8 inches, the door will open, allowing maximum air flow.


VIEW A—ENGINE OFF
SNORKEL TUBE
VACUUM CHAMBER
DIAPHRAGM SPRING
LINKAGE
DIAPHRAGM
CONTROL DAMPER ASSM.
HOT AIR PIPE


VIEW B— UNDERHOOD TEMPERATURE BELOW 85°F
AIR BLEED VALVE CLOSED
DIAPHRAGM SPRING
TEMP. SENSING SPRING
VACUUM CHAMBER
SNORKEL TUBE
LINKAGE
DIAPHRAGM
CONTROL DAMPER ASSM
HOT AIR PIPE


VIEW C—UNDERHOOD TEMPERATURE ABOVE 128°F
AIR BLEED VALVE OPEN
DIAPHRAGM SPRING
SNORKEL TUBE
VACUUM CHAMBER
LINKAGE
DIAPHRAGM
AIR INLET
CONTROL DAMPER ASSM.
HOT AIR PIPE

Thermostatic Air Cleaner: Testing and Inspection

Fig. 83 TAC air door operation. Engine off

Fig. 84 TAC operation. Engine running, temperature below 85 F

Fig. 85 TAC operation. Engine running, temperature above 128 F

FUNCTIONAL TESTING

1. Remove air cleaner cover and install temperature gauge tool No. J-22973 or equivalent, as close as possible to temperature sensor.

2. Install air cleaner cover. Do not install air cleaner cover wing nut.

3. With engine ``OFF'', check damper door position through snorkel opening. Snorkel passage should be open, Fig. 73, if not check for damaged linkage.

4. Start and operate engine at idle. With air temperature below 85° F, snorkel passage should be closed, Fig. 84. When damper door begins to open snorkel passage, remove air cleaner cover and check tool reading. Reading should be between 85° F and 115° F.

5. With air temperature 128° F, damper door should be fully open, Fig. 85. If not check linkage for damage.

6. If damper door does not close completely or does not open at correct temperature, note the following vacuum motor check:

a. Switch engine ``OFF'' and disconnect diaphragm assembly vacuum hose from temperature sensor. b. Connect a vacuum gauge and apply 7 inches Hg to vacuum diaphragm assembly through diaphragm hose. This can be done by blowing into

the diaphragm hose.

c. Damper door should completely close snorkel passage when vacuum is applied. d. If damper door does not close, check linkage for damage and diaphragm for a vacuum leak. e. With vacuum applied, bend or clamp diaphragm hose. Damper door should remain in closed position. If not, replace diaphragm assembly.

VACUUM MOTOR TEST

1. With engine off, look into snorkel to be sure the valve plates are open.

2. Start engine and observe valve plates with engine idling. If equipped, the left plate will close immediately, regardless of temperature.

3. If the temperature in the air cleaner is below 90° F., the right valve plate will also close to outside air. With temperatures above approximately 100 ° F., the valve will remain open.

4. If vacuum motors fail to operate with vacuum directly applied, replace motor.

TEMPERATURE SENSOR TEST

1. With engine temperature below 85° F., tape a thermometer in air cleaner.

2. Install air cleaner cover and start engine.

3. When cold air door starts to open, remove air cleaner cover and check temperature. If temperature is below approximately 85° F., sensor must be replaced. If hoses have been removed from connectors for any reason, it is very important that they be correctly positioned for proper operation.

Thermostatic Air Cleaner: Service and Repair

VACUUM MOTOR, REPLACE

1. Remove air cleaner from engine.

2. Drill out spot welds securing vacuum motor retaining straps to snorkel tube using a 1/16 inch drill bit.

3. Lift then unhook linkage rod from damper door and remove vacuum motor.

4. To install, drill 7/64 inch hole in snorkel tube at center of vacuum motor retaining strap.

5. Reverse procedure to install using sheet metal screws to retain vacuum motor. Ensure that screws do not interfere with operation of damper assembly.

TEMPERATURE SENSOR, REPLACE

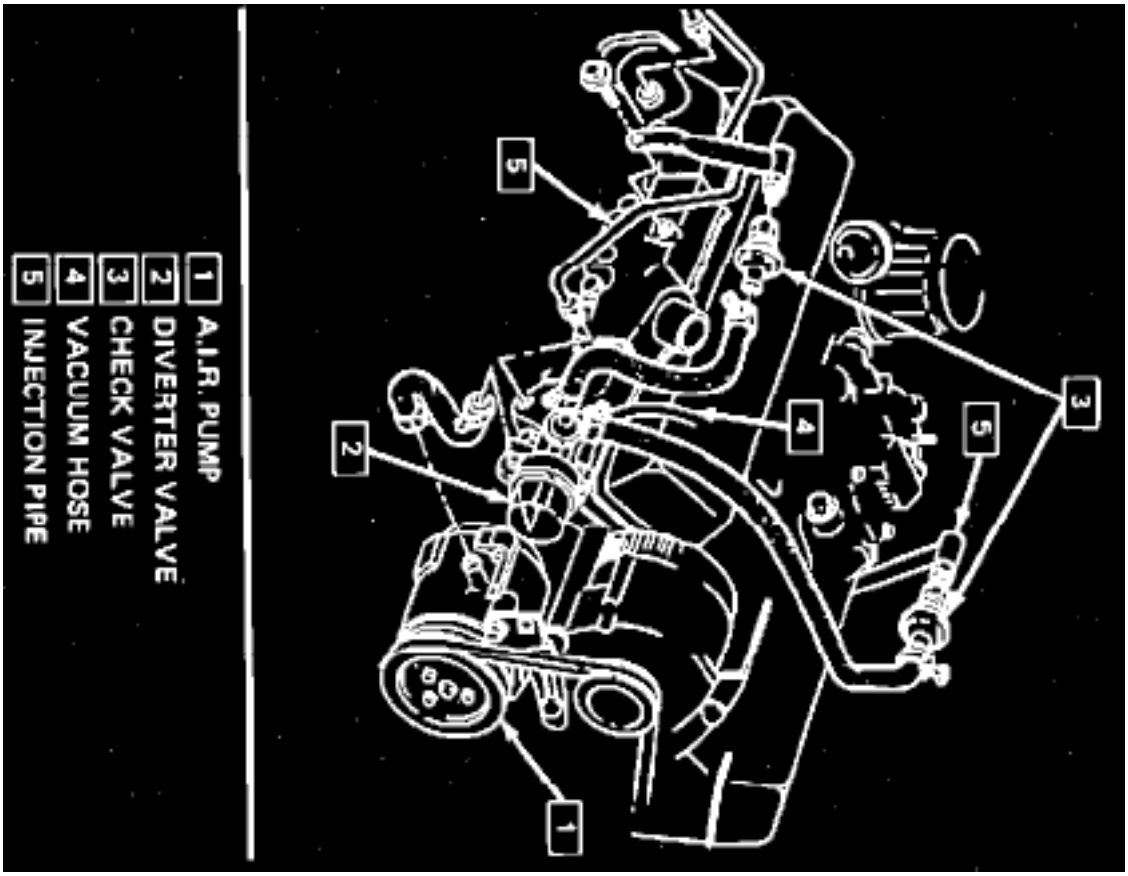
1. Remove air cleaner from engine.

2. Disconnect vacuum hoses from temperature sensor.

3. Pry temperature sensor tabs upward. Note position of temperature sensor before removal from air cleaner. The new temperature sensor must be installed in the same position as the old temperature sensor.

4. Remove clip and sensor from air cleaner.

5. Reverse procedure to install.

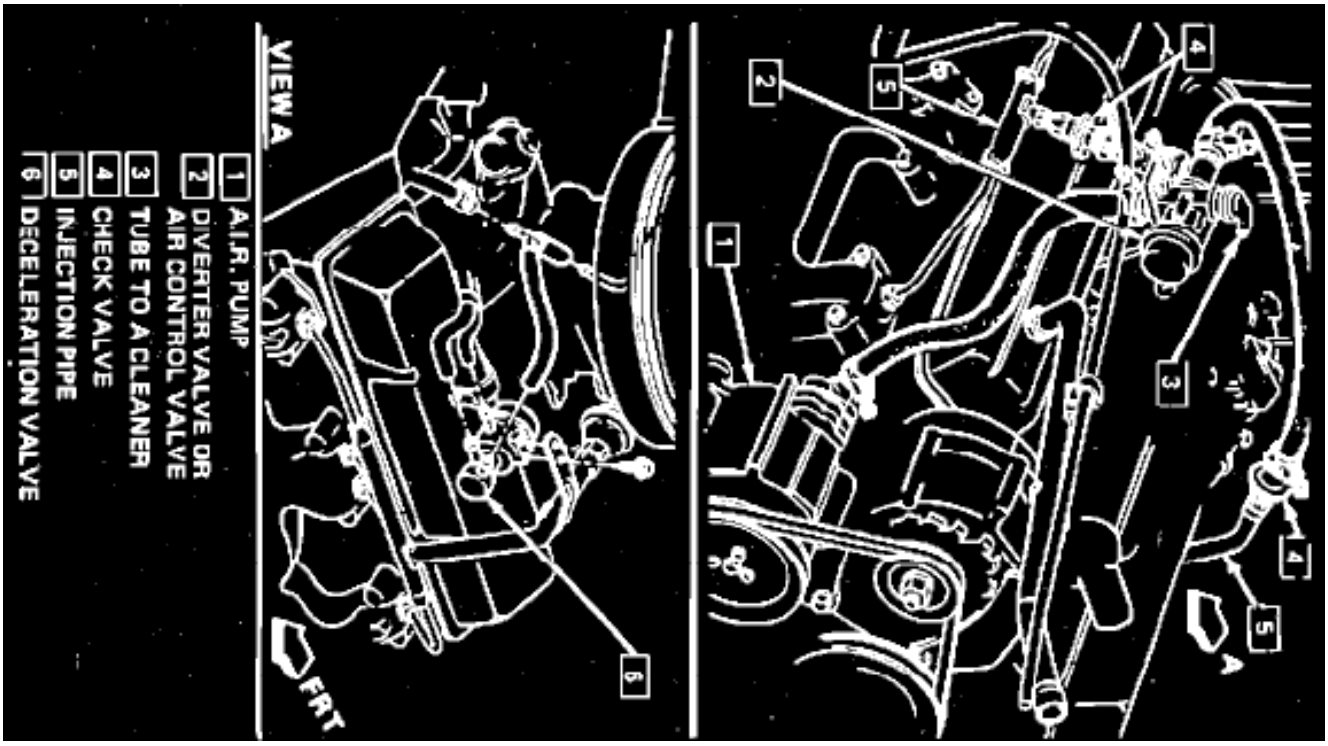


Vacuum Restrictor: Locations Heavy Duty Emissions

Top Of Engine.

On Injection Pipes

Applicable to: 1985 V8 & Heavy Duty Emissions



Vacuum Restrictor: Locations Light Duty Emissions

LH & RH Sides Of Engine.

On Injection Tubes

Applicable to: 1985 V8 & Light Duty Emissions

Fuel Pressure: Specifications

Fuel Pressure .... 27.5 to 44.8 kPa (4 to 6.5 psi) Fuel Pump Vacuum .... 50.6 kPa (15 inches Hg)

Fuel Pressure: Testing and Inspection Fuel Pump Flow Test - Fuel Injected

FUEL PUMP FLOW TEST

1. Disconnect the EFI fuel feed line, then connect suitable hose to line and direct end into suitable container.

2. Apply battery voltage to the fuel pump test terminal. The fuel pump should supply 1/2 pint or more fuel within 15 seconds.

3. If fuel flow is below minimum, check for fuel restrictions. If there is no restrictions, check pump vacuum and/or pressure.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Fuel Injected

FUEL PRESSURE TEST

- Turn engine "OFF" and perform Fuel Pressure Relief procedure.

CAUTION: A small amount of fuel may be released, after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Place the cloth in an approved container when disconnect is completed.

- Install fuel pressure gage J-29658A/BT8205, or equivalent, at the outlet side of the in-line fuel filter.

- Start engine and observe fuel pressure reading. It should be 62-90 kPa (9-13 psi).

- Relieve fuel pressure.

- Remove fuel pressure gage.

- Re-install fuel hose or pipe assembly to in-line fuel filter.

- Start engine and check for fuel leaks.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB # 90-6C-89, Dated 9/90

Some 1985-90 engines equipped with 2.5L, 2.8L, 4.3L, 5.0L, 5.7L or 7.4L may experience a condition where fuel delivery is interrupted to the engine causing a "no start condition". This condition may be caused by deterioration of the in-tank fuel pump coupler hose located between the fuel pump sending unit and the fuel pump. This condition may be repaired by replacing the original coupler hose with a new VITON coupler hose kit P/N 25028041. The kit consist of a new VITON hose and two clamps.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Mechanical Fuel Pump

FUEL PUMP PRESSURE TEST

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be (4 to 6.5 psi). 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pressure: Testing and Inspection Fuel Pump Vacuum Test - Mechanical Fuel Pump

FUEL PUMP VACUUM TEST

1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least (15" Hg.). If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.

Fuel Pressure: Testing and Inspection Fuel System Pressure Test - Carbureted

Fuel Pump Flow Test:

1. Connect hose from carburetor fuel feed line to a suitable unbreakable container and crank engine. 2. Fuel pump should supply 1/2 pint or more in 15 seconds. 3. If flow is below minimum, check for fuel restriction. If there is no restriction, check pump pressure and/or vacuum.

Fuel Pump Pressure Test:

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be 4 to 6.5 psi. 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pump Vacuum Test:

1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least 15" Hg. If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.

Fuel Pressure Release: Service and Repair

Throttle Body Injected Engines

1. Remove fuel pump fuse from fuse box. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and replace fuel pump fuse.

Port Injected Engines

1. Disconnect fuel tank harness connector. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and reconnect fuel tank harness connector.

Idle Speed: Specifications Enriched Idle Speed

ENRICHED IDLE SPEED

Carburetor Number

17085206 ..... 20 17085208 10
17085209 ..... 50 17085210 10
17085211 50

17085220 ..... 75 17085221 75
17085222 ..... 20 17085223 50
17085224 20

17085225 ..... 50 17085226 20
17085227 ..... 20 17085228 30
17085229 30

17085230 ..... 20 17085231 40
17085235 ..... 80 17085239 75
17085283 75

17085284 ..... 20 17085285 20
17085290 ..... 30 17085291 100
17085292 ..... 30 17085293 100

NOTE: Enriched Idle Speed value is added to base idle speed. This value is used during the idle mixture adjustment procedure.

Idle Speed: Specifications Idle Speed

CURB IDLE SPEED

Light Duty

Manual ..... 700 rpm Automatic ..... 550 rpm (High Altitude 600)

Heavy Duty

Manual ..... 600 rpm Automatic ..... 700 rpm

A/C ON IDLE SPEED

Manual ..... 800 rpm Automatic ..... 650 rpm

FAST IDLE SPEED

Light Duty

Manual ..... 1300 rpm Automatic

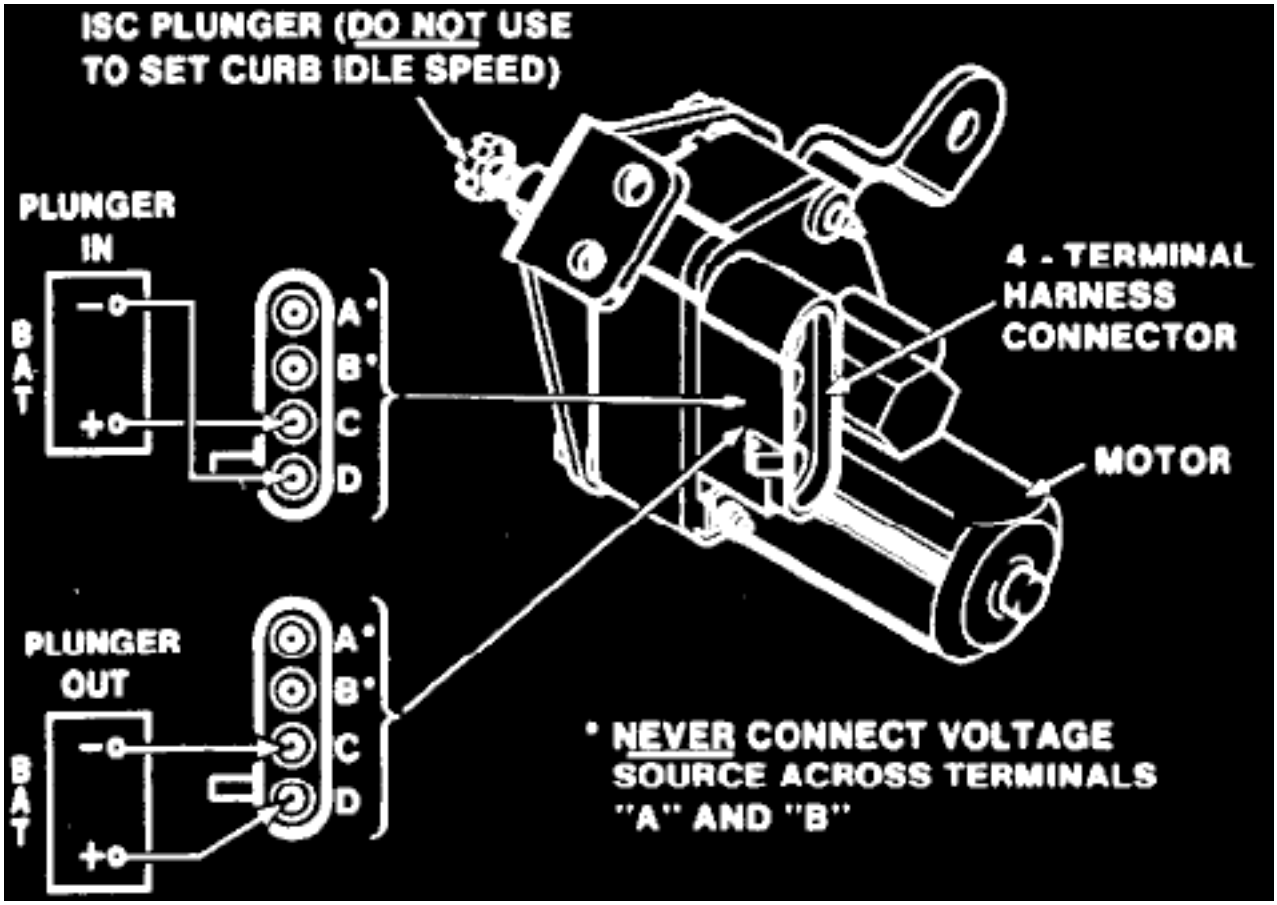
Federal ..... 1600 rpm California ..... 1800 rpm

High Altitude ..... 1400 rpm

Heavy Duty

Automatic/Manual ..... 1900 rpm

NOTE: All fast idle speeds are measured with the fast idle cam on the high step.



Idle Speed: Adjustments Idle Speed

California

NOTE: On engines equipped with an Idle Speed Control (ISC) motor, idle speed is controlled by an electrical signal from the Electronic Control Module (ECM). Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows.

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures:

- Check and adjust ignition timing.

- Disconnect and plug vacuum lines for evaporative purge and EGR valve.

2. Before starting engine, place transmission in "PARK" (automatic) or "NEUTRAL" (manual), set parking brake and block drive wheels. 3. Connect dwell meter to Mixture Control (M/C) solenoid dwell lead. This is a green connection breaking out of the main wiring harness leading to

carburetor.

NOTE: Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF". 5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary). 6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

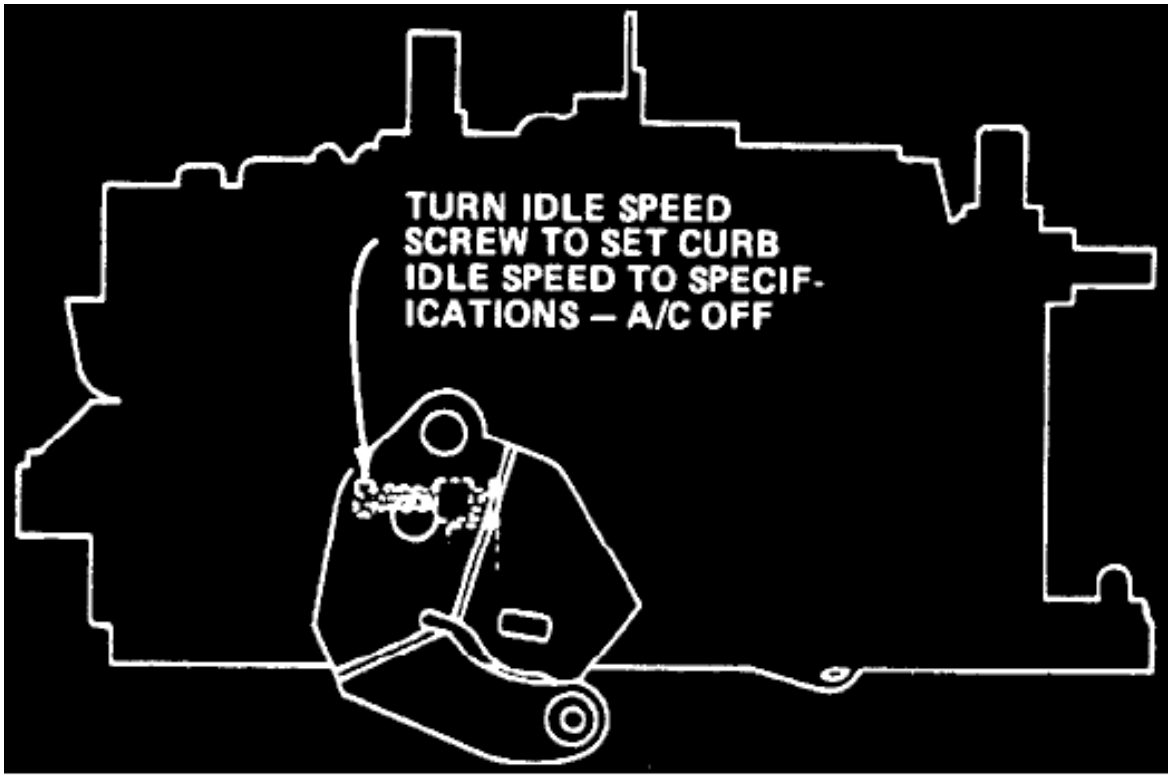
7. Unplug connector from ISC motor.

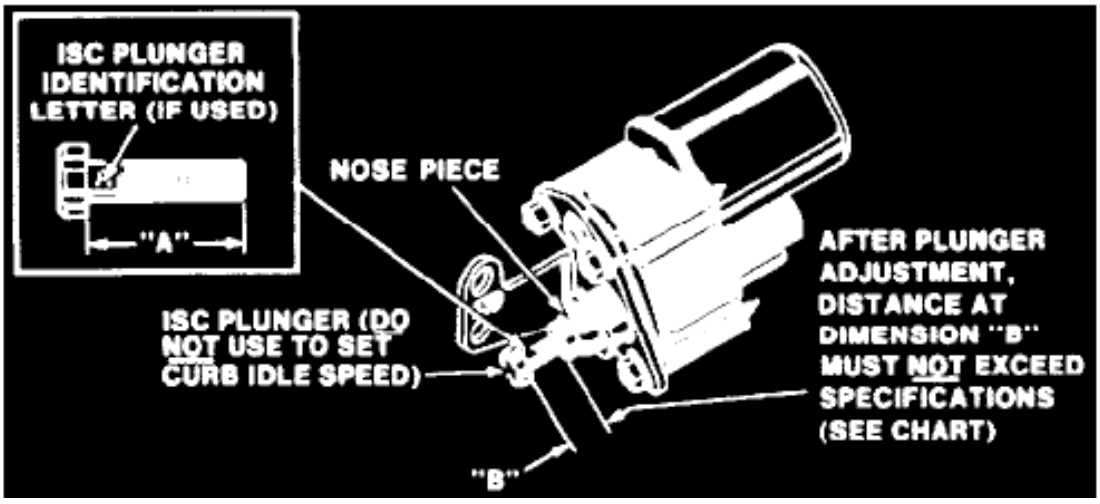
8. Fully retract ISC plunger by applying 12 volts to terminal "C" ad grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place automatic transmission in "DRIVE".


TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIF-ICATIONS – A/C OFF


ISC PLUNGER IDENTIFICATION LETTER (IF USED)
"A"
NOSE PIECE
ISC PLUNGER (DO NOT USE TO SET CURB IDLE SPEED)
"B"
AFTER PLUNGER ADJUSTMENT, DISTANCE AT DIMENSION "B" MUST NOT EXCEED SPECIFICATIONS (SEE CHART)

11. With ISC plunger fully retracted, adjust carburetor base (slow idle stop screw to 470 RPM (minimum authority). 12. Place transmission in "PARK" (automatic transmissions). 13. Fully extend ISC plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC motor connection. Leave power

applied only long enough to extend the plunger.

14. MANUAL TRANSMISSIONS: Using tool J29607 or BT-8022 or equivalent, turn ISC plunger to obtain 900 RPM (Maximum Authority). 15. AUTOMATIC TRANSMISSIONS:

- With transmission in "PARK", using tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

- With parking brake set and drive wheels blocked, place transmission in "DRIVE". Turn ISC plunger to obtain 900 RPM (Maximum Authority).

16. Recheck ISC "Maximum Authority" RPM with voltage applied to ISC motor (step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nosepiece. Dimension "B" must not exceed that shown

in below chart.

IDLE SPEED CONTROL PLUNGER		
IDENTIFICATION LETTER	PLUNGER LENGTH DIMENSION A	AFTER ADJUSTMENT (STEPS 14, 15, or 16), DISTANCE AT DIMENSION "B" MUST NOT EXCEED
NONE	14.1 mm (9/16")	5.6 mm (7/32")
NONE	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/64")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1")	17.1 mm (43/64")
L	27.5 mm (1 3/32")	19.0 mm (3/4")
J	30.0 mm (1 3/16")	21.5 mm (27/32")
N	32.0 mm (1 17/64")	23.5 mm (59/64")
T	34.0 mm (1 11/32")	25.5 mm (1")

18. Fully retract ISC plunger (step 8). Place transmission in "PARK" (automatic) or "NEUTRAL" (manual) and turn ignition "OFF". Disconnect 12

volt power source, ground lead, tachometer and dwell meters. With ignition "OFF" reconnect four terminal harness connector to ISC motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By

restoring the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Federal

PRELIMINARY PROCEDURES

- Warm engine to normal operating temperature (upper radiator hose hot).

- Turn "OFF" all accessories, including A/C.

- Check Timing (adjust if not to specification). See: Ignition System/Ignition Timing

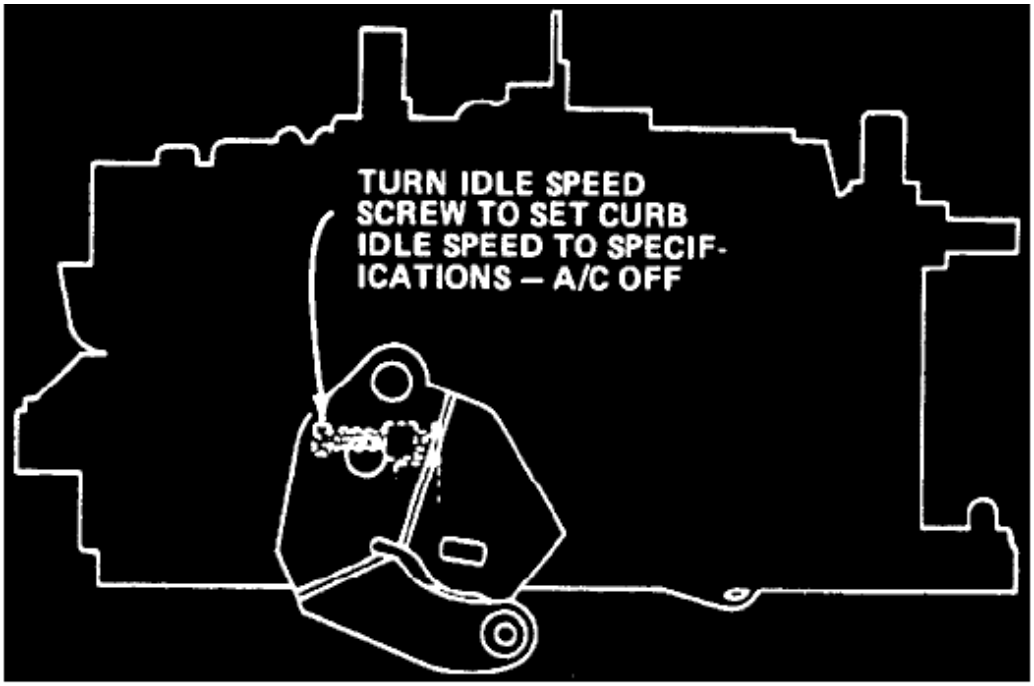
- Connect tachometer.

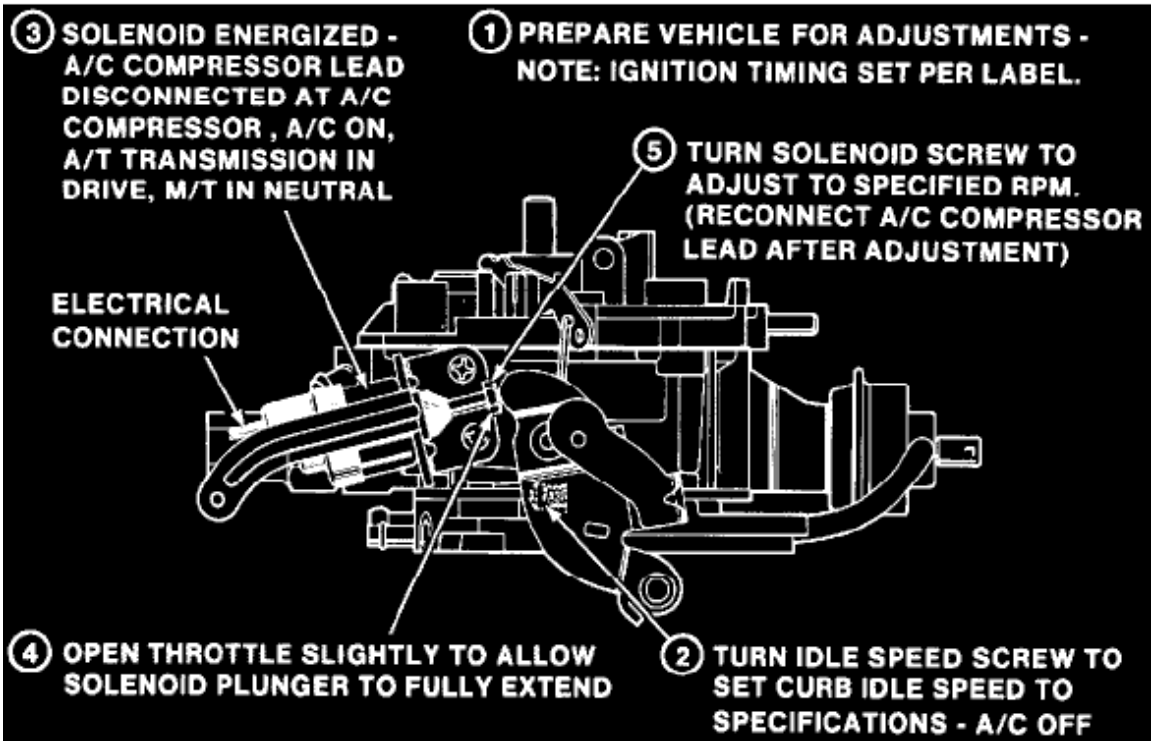
CAUTION: Exercise care not to ground the TACH terminal (which is located next to the BAT connector) as this may damage the Electronic Control Module (ECM) or coil.

CURB IDLE SPEED

- Disconnect and plug vacuum hose to EGR valve and canister purge.

- Adjust curb idle speed.


TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIF-ICATIONS – A/C OFF


3 SOLENOID ENERGIZED - A/C COMPRESSOR LEAD DISCONNECTED AT A/C COMPRESSOR , A/C ON, A/T TRANSMISSION IN DRIVE, M/T IN NEUTRAL
1 PREPARE VEHICLE FOR ADJUSTMENTS - NOTE: IGNITION TIMING SET PER LABEL.
5 TURN SOLENOID SCREW TO ADJUST TO SPECIFIED RPM. (RECONNECT A/C COMPRESSOR LEAD AFTER ADJUSTMENT)
ELECTRICAL CONNECTION
4 OPEN THROTTLE SLIGHTLY TO ALLOW SOLENOID PLUNGER TO FULLY EXTEND
2 TURN IDLE SPEED SCREW TO SET CURB IDLE SPEED TO SPECIFICATIONS - A/C OFF

Without A/C -

Turn idle speed screw to specified curb idle (automatic transmissions in drive with wheels blocked and parking brake set). See: Specifications

With A/C -

With A/C "OFF", turn idle speed screw to specified curb idle (automatic transmissions in drive with wheels blocked and parking brake set).

- Disconnect wire to A/C compressor clutch and turn A/C "ON".

- Open throttle momentarily to assure solenoid plunger is fully extended.

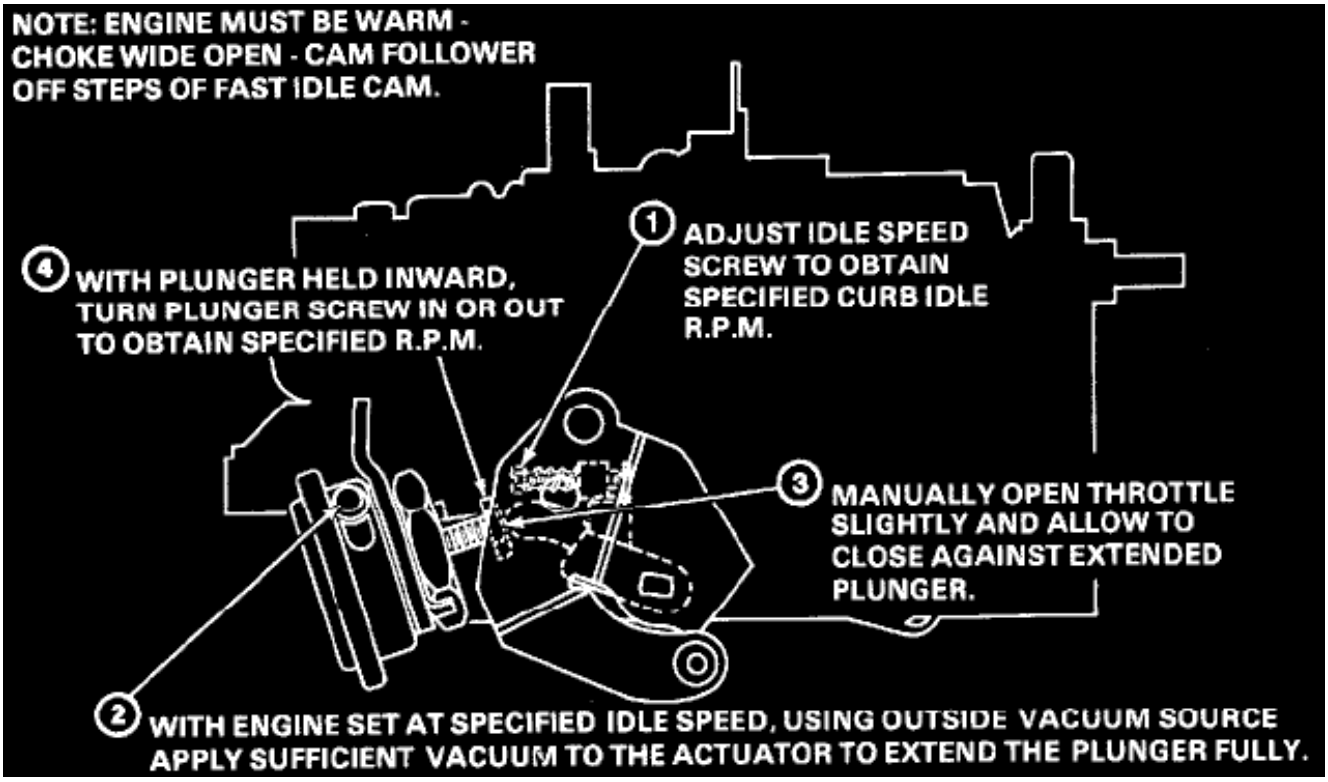
- Turn solenoid screw to the specified idle speed. See: Specifications

- Reconnect wire to compressor clutch.

THROTTLE LEVER ACTUATOR

- Disconnect vacuum hose from solenoid valve to the actuator diaphragm.

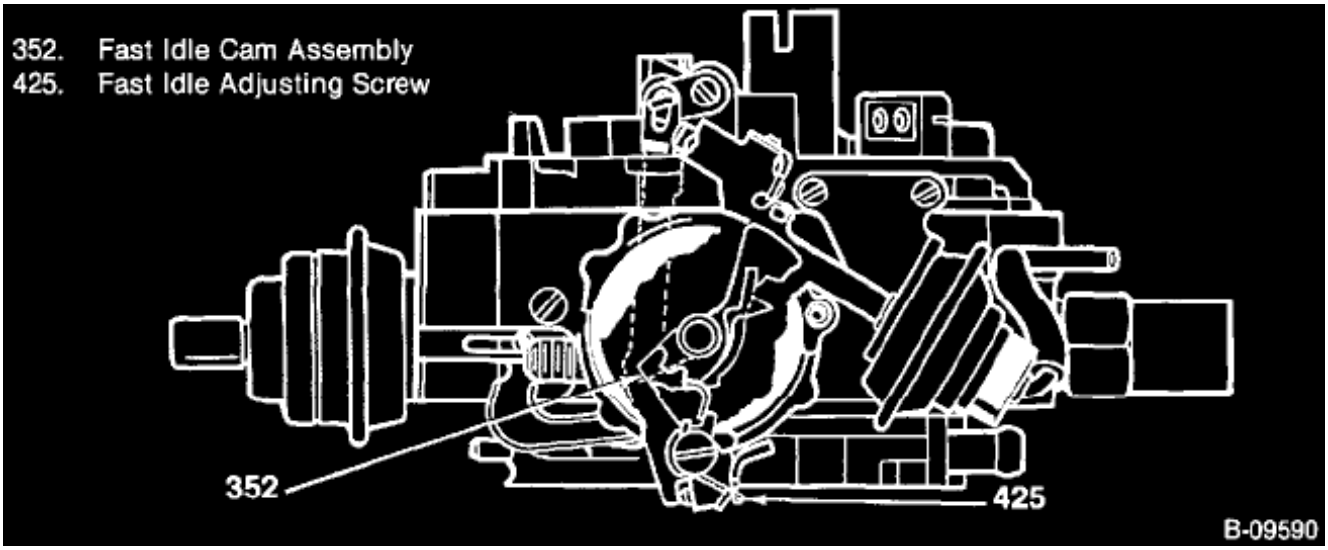
- Connect an external vacuum source to the diaphragm and apply 20 inches of vacuum.



- Manually open the throttle slightly and allow it to close against the extended actuator plunger. With engine warm, idle speed should be:

Federal - 1500 rpm California - 1600 rpm

NOTE: The throttle lever actuator is designed to control emissions by holding the throttle open slightly during deceleration and coasting.



Idle Speed: Adjustments Fast Idle Speed

Carbureted

Fast Idle Adjustment

Check and, if necessary, adjust ignition timing before adjusting fast idle speed. Make all adjustments with engine at normal operating temperature, choke fully open, air cleaner installed and A/C control off, if equipped.

1. Disconnect and plug vacuum hoses as directed on vehicle emission control label.

2. Position fast idle screw on specified step of fast idle cam as directed on vehicle emission control label.

3. Turn fast idle screw in or out and adjust fast idle speed to specifications.

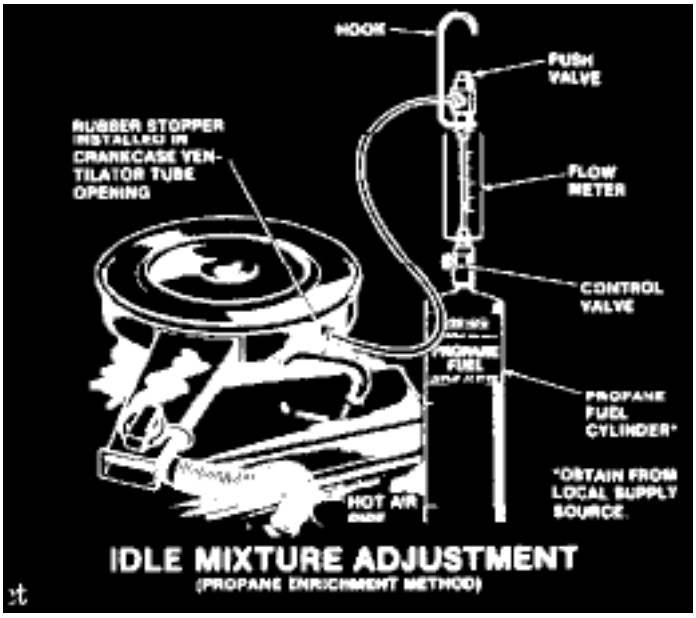
With Carburator Only

Check and, if necessary, adjust ignition timing before adjusting fast idle speed. Make all adjustments with engine at normal operating temperature, choke fully open, air cleaner installed and A/C control off, if equipped.

1. Disconnect and plug vacuum hoses as directed on vehicle emission control label.

2. Position fast idle screw on specified step of fast idle cam as directed on vehicle emission control label.

3. Turn fast idle screw in or out and adjust fast idle speed to specifications.



Air/Fuel Mixture: Adjustments Federal

Light Duty

NOTE: Vehicles with a Gross Vehicle Weight Rating (GVWR) below 6000 lbs (8500 lbs for California), and passenger carrying vehicles with a capacity of 12 persons or less, are Light Duty Emissions Vehicles.

NOTE: Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement or high emissions as determined by official inspections. Adjusting mixture by other than the following method may violate Federal and or California or other state or Provincial laws. Because of the sealed idle mixture needles, the idle mixture checking procedure requires artificial enrichment by adding propane.

1. Set parking brake and block drive wheel. Engine must be at normal operating temperature and air conditioning off. 2. Disconnect and plug EGR and cannister purge vacuum hoses. 3. Connect an accurate tachometer to engine. 4. Disconnect vacuum advance and set timing to specification. Reconnect vacuum hose. See: Ignition System/Ignition Timing 5. Set carburetor idle speed to specification. See: Adjustments 6. Disconnect crankcase ventilation tube from air cleaner.

Fig. 61 - Propane Enrichment Tool Installation

7. Using tool J-26911, insert hose with rubber stopper, from propane valve into crankcase ventilation tube opening in air cleaner. Propane cartridge

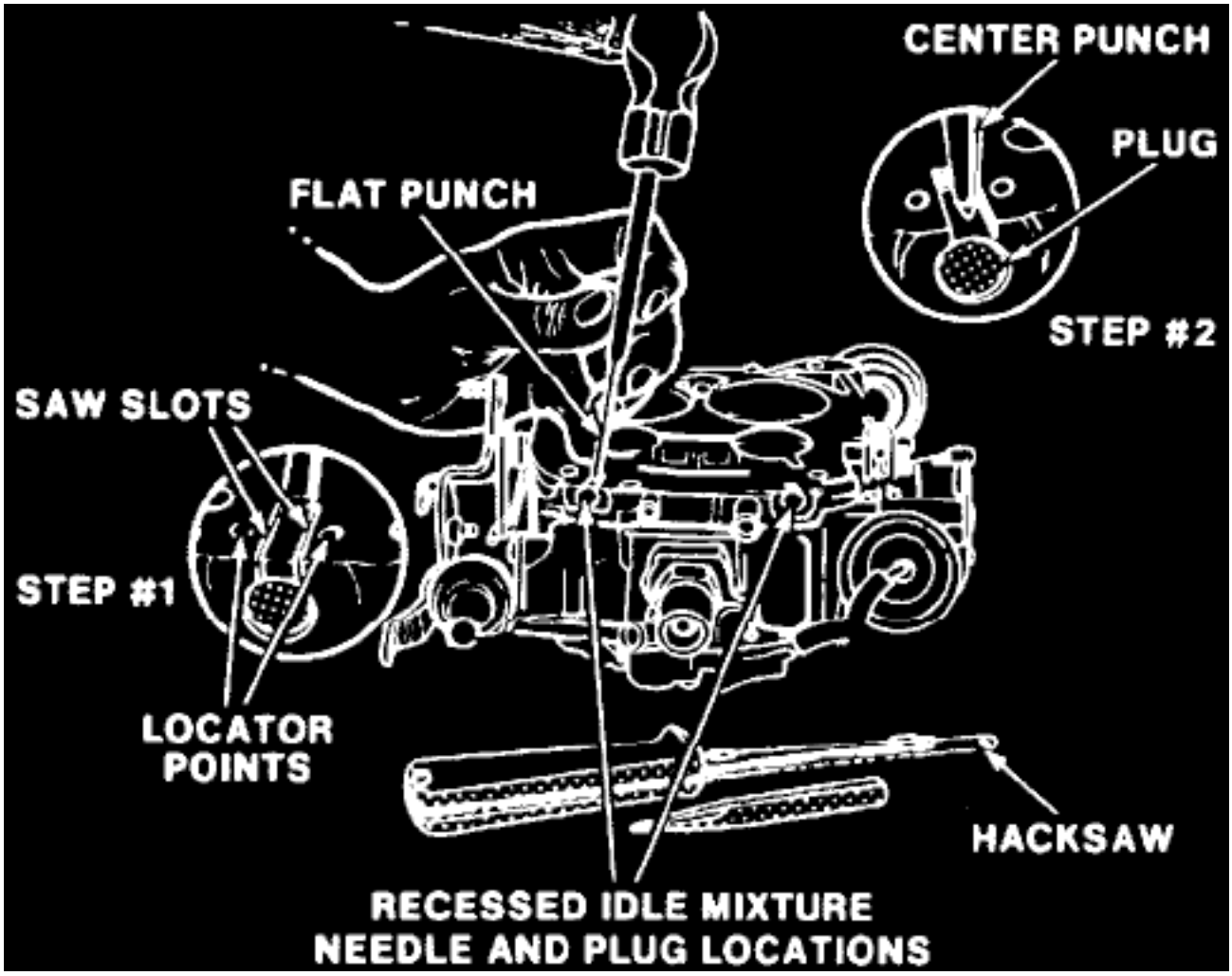
must be vertical.

8. With engine idling in drive (neutral for manual shifts) slowly open propane control valve while pressing button. Continue to add propane until

speed drops due to over richness. Note maximum engine speed (enriched speed).

9. If the enriched idle speed is within the enriched idle specification the mixture is correct. Go to step 17.

Enrichment Specification: See: Idle Speed/Specifications



10. If the enriched idle speed is not within specification, remove mixture screw plugs as follows:

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.

11. Using tool J29030 or equivalent, lightly seat mixture needles, then back out equally, just enough so engine will run. 12. Place transmission in drive (automatic) or neutral (manual). 13. Back each screw out (richen 1/8 turn at a time until maximum idle speed is obtained). Then using base idle speed adjustment screw, set idle speed

to the enriched idle specification. See: Idle Speed/Specifications

14. Turn each mixture screw in (clockwise) 1/8 turn at a time until idle speed reaches base idle speed. 15. Re-check enriched speed with propane. If not within specification, repeat adjustment beginning with step 12. 16. After adjustments are complete, seal the idle mixture needle setting using silicone sealant or equivalent. The sealer is required to prevent

tampering with the setting and to prevent the possibility of loss of fuel vapors.

17. Check and adjust fast idle speed. See: Adjustments 18. Turn off engine. Remove propane tool, connect crankcase ventilation tube. Unplug and reconnect vacuum hoses. Install air cleaner.

Heavy Duty

NOTES:

- Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement, or high emissions as determined by official inspections.

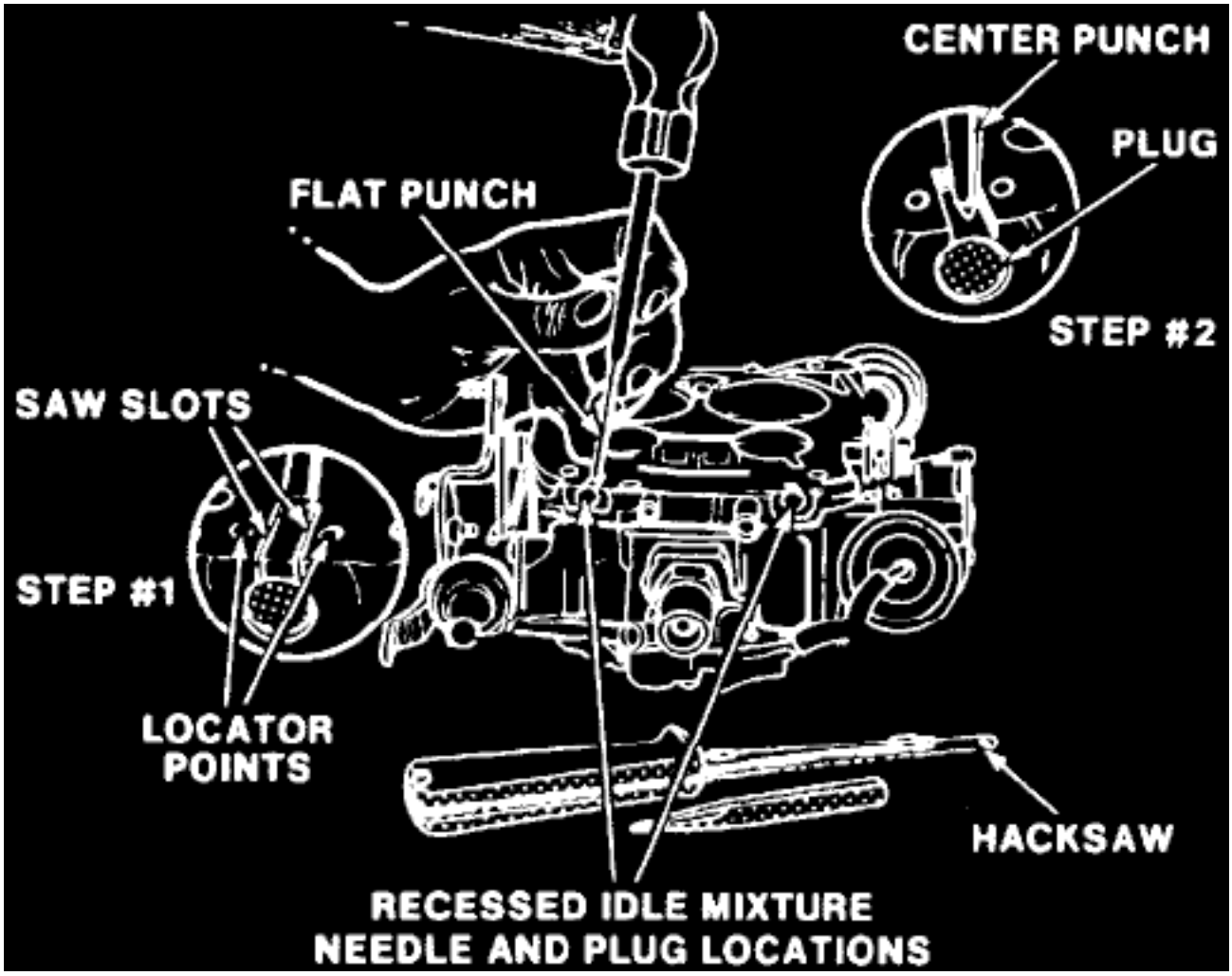
- If necessary, remove idle needle plugs:

- Perform this adjustment with engine at operating temperature, parking brake applied, drive wheels blocked and transmission in park or neutral.

ADJUSTMENT PROCEDURE

1. Remove air cleaner. 2. Connect tachometer and vacuum gage to engine. 3. As a preliminary adjustment, turn idle mixture needles in lightly to seat and back out 2 turns.

NOTE: Do not turn idle mixture needle tightly against seat or damage may result.



4. With engine running (choke wide open and transmission in neutral) adjust idle speed screw to curb idle speed. See: Idle Speed/Adjustments/Idle

Speed

5. Adjust each idle mixture needle to obtain highest RPM. 6. Repeat steps 4 and 5 until "best" idle is obtained. 7. If necessary, reset curb idle speed. See: Idle Speed/Adjustments/Idle Speed/Federal 8. After adjustments are complete, seal the idle mixture needle setting using silicone sealant or equivalent. 9. Check and if necessary, adjust throttle lever actuator.See: Idle Speed/Adjustments/Idle Speed

10. Check and if necessary, adjust fast idle speed. See: Idle Speed/Adjustments/Fast Idle Speed 11. Turn off engine, remove gages, unplug and reconnect vacuum hoses. Install air cleaner. 12. Remove block from drive wheel.

CONCEALMENT PLUG REMOVAL

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

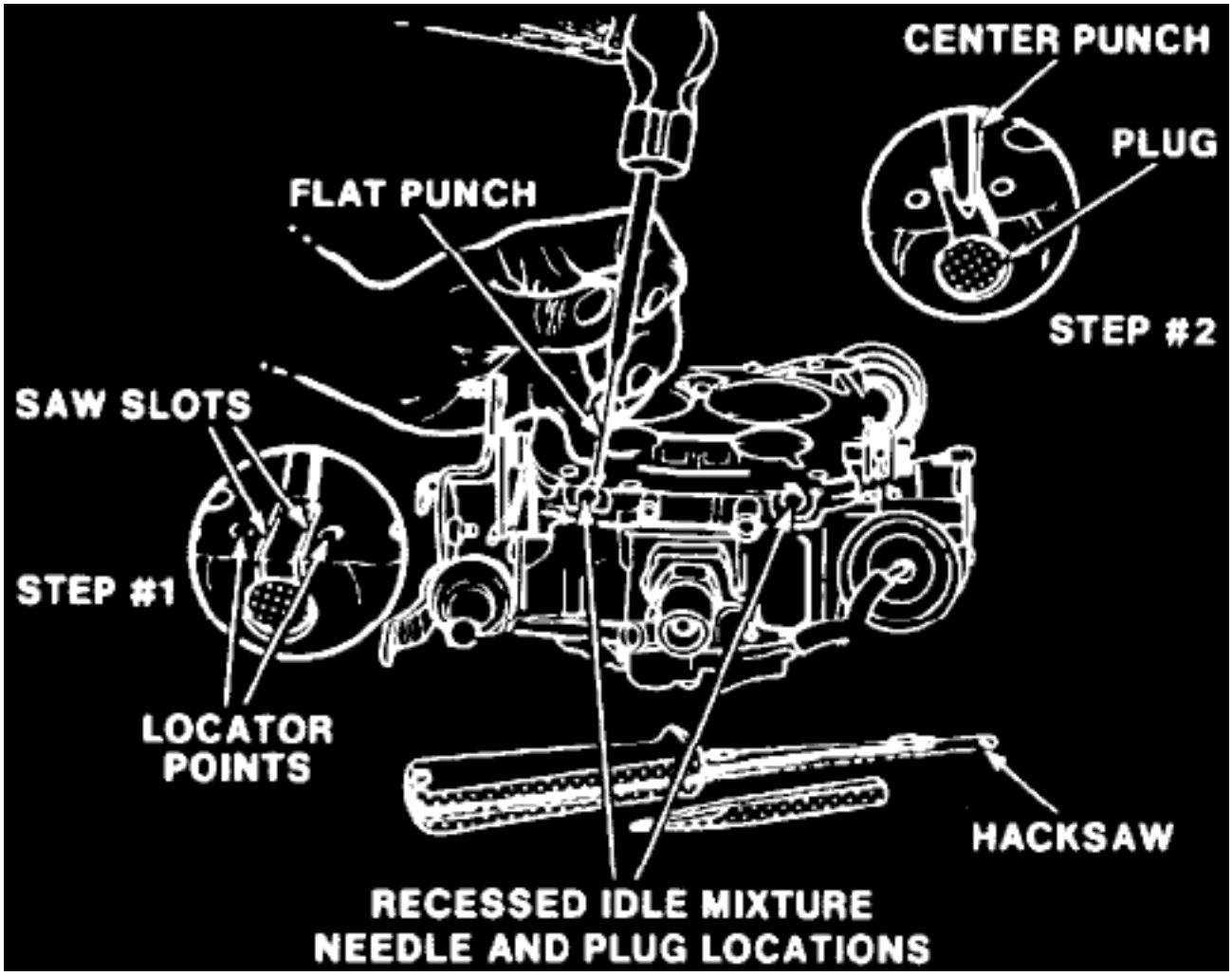
- Place a flat punch at a point near the ends of the saw marks in the throttle body. Holding the punch at a 45 degree angle, drive it into the throttle body until the casing breaks away, exposing the steel plug.

- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.



Air/Fuel Mixture: Adjustments California

IDLE MIXTURE NEEDLES ADJUSTMENT

1. Remove concealment plugs if necessary:

- Remove carburetor from engine to gain access to the plugs covering the idle mixture needles.

- Invert carburetor on a suitable holding fixture, manifold side up.

NOTE: Use care to avoid damaging linkage, tubes, and parts protruding from the air horn.

- Make two parallel cuts in the throttle body on either side of the locator points beneath the idle mixture needle plug (manifold side) with a hack saw. The cuts should not extend more than 1/8 inch beyond the locator points. The distance between the saw marks depends on the size of the punch to be used.

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- Holding a center punch vertical, drive it into the steel plug.

- Then holding the punch at a 45 degree angle, drive the plug out of the casting.

NOTE: Hardened plug may break rather than remain intact. It is not necessary to remove the plug completely, instead, remove loose pieces.

- Repeat procedure for the remaining mixture needle and re-install carburetor.

NOTE: Always use a new carburetor base gasket.

2. Using tool J030930, BT-7610-B, or equivalent, remove both idle mixture needles and springs for inspection:

- Needles must not be bent, burred or otherwise damaged.

- Inspect both idle needle openings in the throttle body for any damage or foreign material. Clean as necessary.

3. Install idle mixture needles and springs:

- Turn both mixture needles clockwise until lightly seated.

- Turn each mixture needle counter clockwise 3 turns.

4. Disconnect vacuum hose to canister purge valve and plug it. 5. Place a spacer (0.75 to 0.10 inches) between accelerator pump lever and Throttle Position Sensor (TPS) plunger. 6. Connect dwell meter to Mixture Control (M/C) solenoid dwell lead. This is a green connection breaking out of the main wiring harness leading to

carburetor.

NOTE: Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested

7. Start engine and allow it to reach normal operating temperature. 8. While idling in "DRIVE" (NEUTRAL for manual transmission) adjust both mixture needles equally, in 1/8 turn increments, until dwell reading

varies within the 25-35° range, attempting to be as close to 30° as possible.

NOTE: If reading is too high, turn mixture needles clockwise. If reading is too low, turn mixture needles counterclockwise. Allow time for dwell reading to stabilize after each adjustment.

9. After adjustments are complete, seal the idle mixture needle opening in the throttle body, using silicone sealant or equivalent.

10. Check and adjust idle speed.

DO THIS	DON'T DO THIS
First, Inspect the vehicle for a reusable aftermarket excessively/over- oiled air filter	DO NOT repair MAF sensors under warranty if concerns result from the use of an excessively/over-oiled aftermarket, reusable air filter.

Air Filter Element: Customer Interest Engine, A/T - Shift/Driveability Concerns/MIL ON

Bulletin No.: 04-07-30-013B

Date: February 01, 2007

INFORMATION

Subject: Automatic Transmission Shift, Engine Driveability Concerns or Service Engine Soon (SES) Light On as a Result of the Use of an Excessively/Over-Oiled Aftermarket, Reusable Air Filter

Models: 2007 and Prior GM Cars and Light Duty Trucks 2007 and Prior Saturn Models 2003-2007 HUMMER H2 2006-2007 HUMMER H3 2005-2007 Saab 9-7X

Supercede:

This bulletin is being revised to add models and model years. Please discard Corporate Bulletin Number 04-07-30-013A (Section 07 - Transmission/Transaxle).

The use of an excessively/over-oiled aftermarket, reusable air filter may result in:

Service Engine Soon (SES) light on

Transmission shift concerns, slipping and damaged clutch(es) or band(s)

Engine driveability concerns, poor acceleration from a stop, limited engine RPM range

The oil that is used on these air filter elements may be transferred onto the Mass Air Flow (MAF) sensor causing contamination of the sensor. As a result, the Grams per Second (GPS) signal from the MAF may be low and any or all of the concerns listed above may occur.

When servicing a vehicle with any of these concerns, be sure to check for the presence of an aftermarket reusable, excessively/over-oiled air filter. The MAF, GPS reading should be compared to a like vehicle with an OEM air box and filter under the same driving conditions to verify the concern.

The use of an aftermarket reusable air filter DOES NOT void the vehicle's warranty.

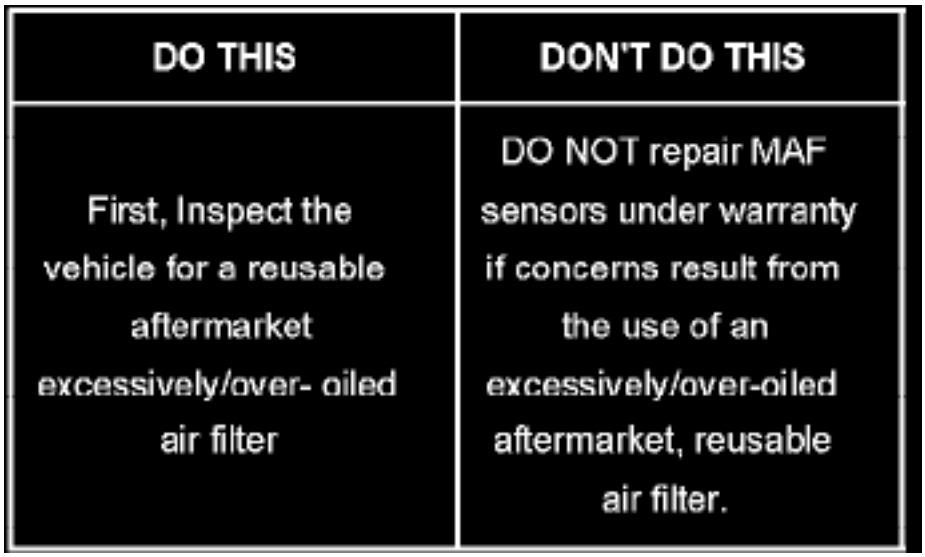
If an aftermarket reusable air filter is used, technicians should inspect the MAF sensor element and the air induction hose for contamination of oil prior to making warranty repairs.

Transmission or engine driveability concerns (related to the MAF sensor being contaminated with oil) that are the result of the use of an aftermarket reusable, excessively/over-oiled air filter are not considered to be warrantable repair items.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

Disclaimer



Air Filter Element: All Technical Service Bulletins Engine, A/T - Shift/Driveability Concerns/MIL ON

Bulletin No.: 04-07-30-013B

Date: February 01, 2007

INFORMATION

Subject: Automatic Transmission Shift, Engine Driveability Concerns or Service Engine Soon (SES) Light On as a Result of the Use of an Excessively/Over-Oiled Aftermarket, Reusable Air Filter

Models: 2007 and Prior GM Cars and Light Duty Trucks 2007 and Prior Saturn Models 2003-2007 HUMMER H2 2006-2007 HUMMER H3 2005-2007 Saab 9-7X

Supercede:

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The use of an excessively/over-oiled aftermarket, reusable air filter may result in:

Service Engine Soon (SES) light on

Transmission shift concerns, slipping and damaged clutch(es) or band(s)

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When servicing a vehicle with any of these concerns, be sure to check for the presence of an aftermarket reusable, excessively/over-oiled air filter. The MAF, GPS reading should be compared to a like vehicle with an OEM air box and filter under the same driving conditions to verify the concern.

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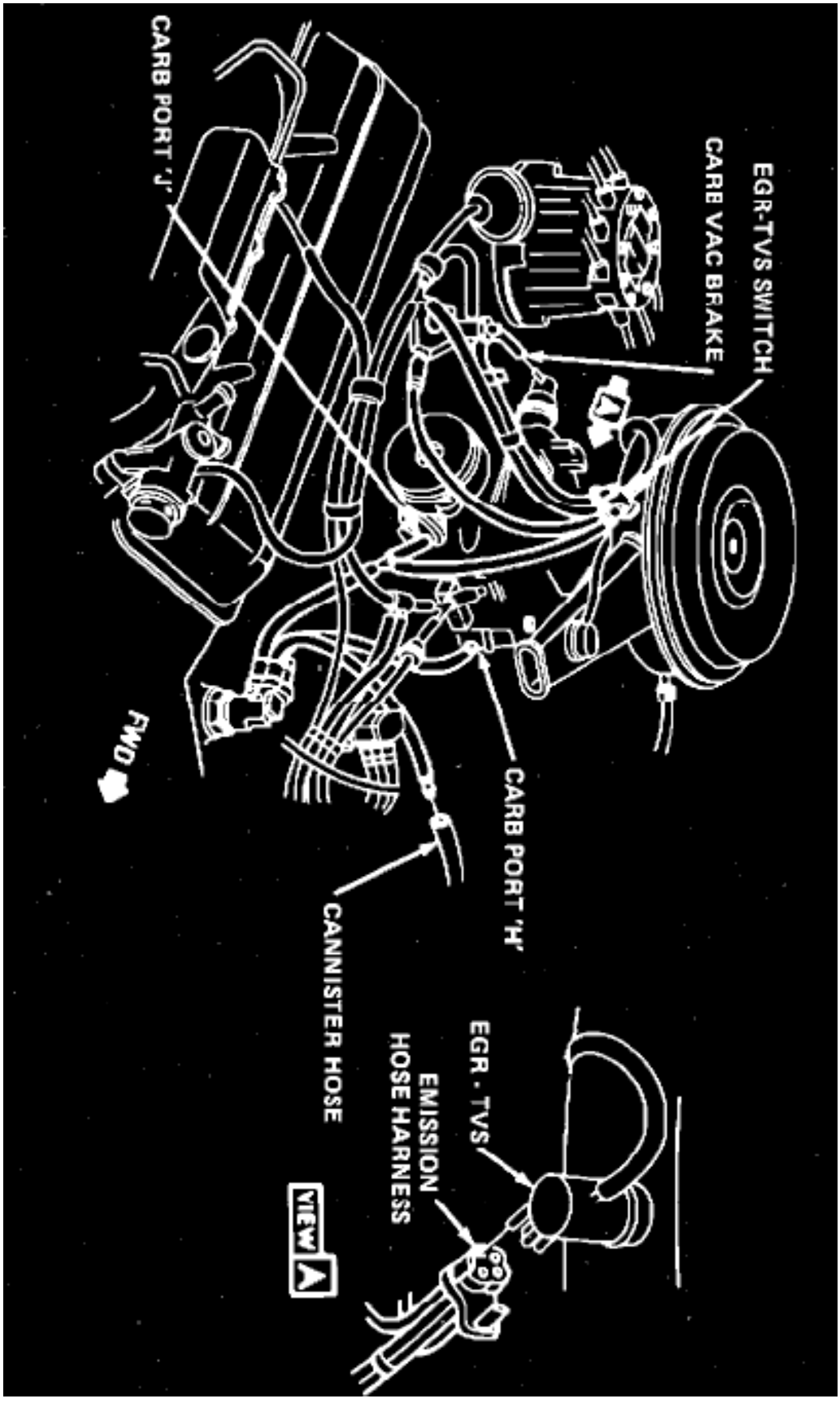
Disclaimer

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Fuel Delivery and Air Induction > Carburetor > Choke Pull-off > Choke Pull-off Delay Valve > Component Information > Locations

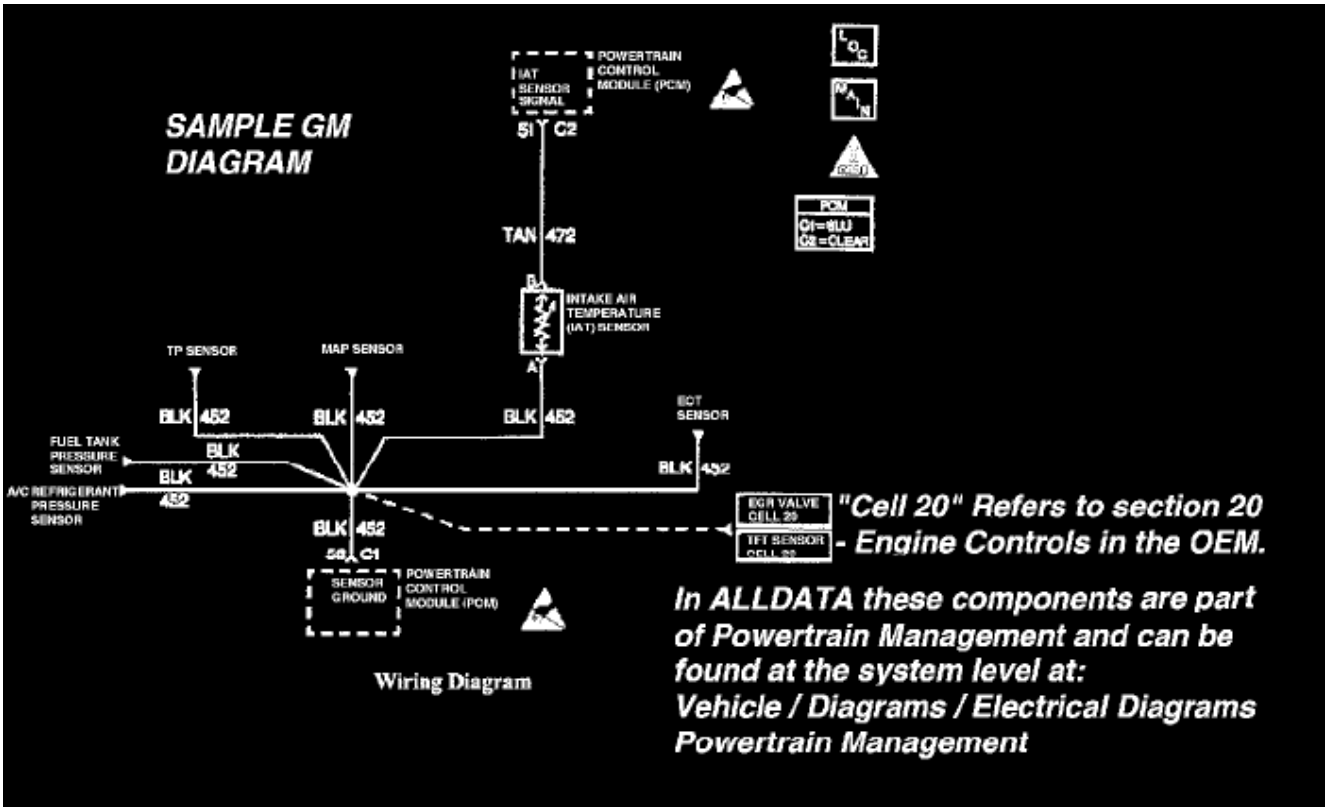


Choke Pull-off Delay Valve: Locations

RH Top Front Of Engine.

RH Side Top Of Engine

Applicable to: 1981-82 5.0L & 5.7L California



Choke Thermostat/Heater: Diagram Information and Instructions

CELL REFERENCES

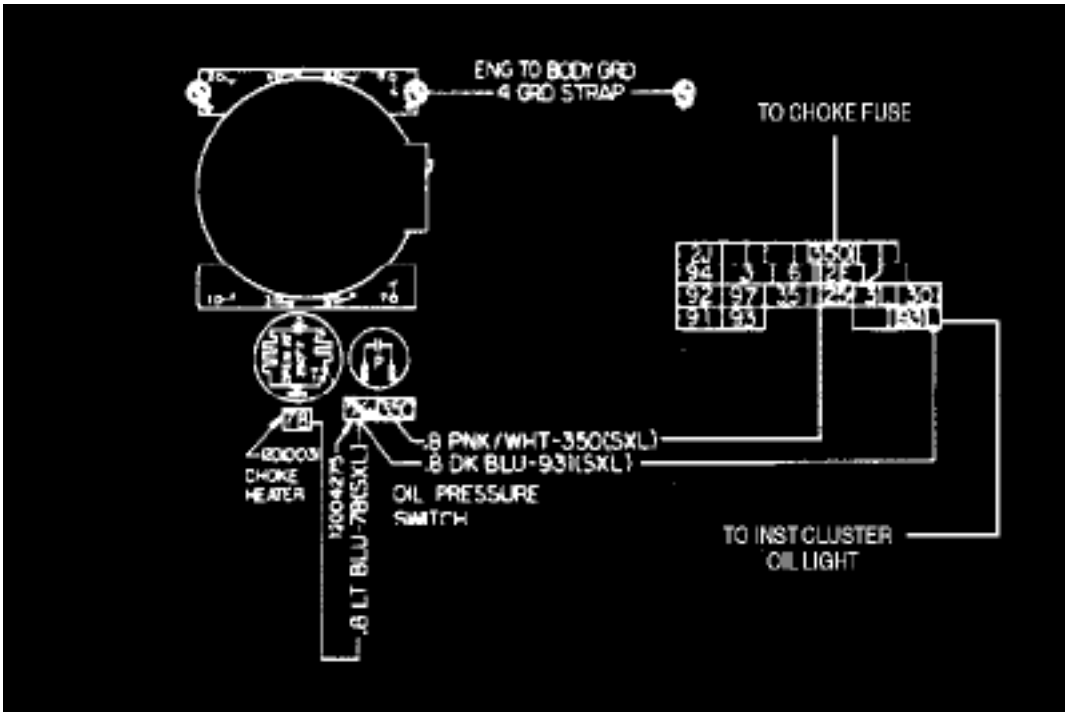
General Motors vehicles often use "CELL" references in their electrical wiring diagrams. These references are used in the Original Equipment Manual to refer to a section in the manual and not a specific diagram(s).

GM Sample Diagram W/ Cell Reference

For instance, in the diagram illustrated "Cell 20" is not a reference to another diagram but a reference to "Section 20" in the OE manual. In the example, "Section 20" is the engine control section of the manual.

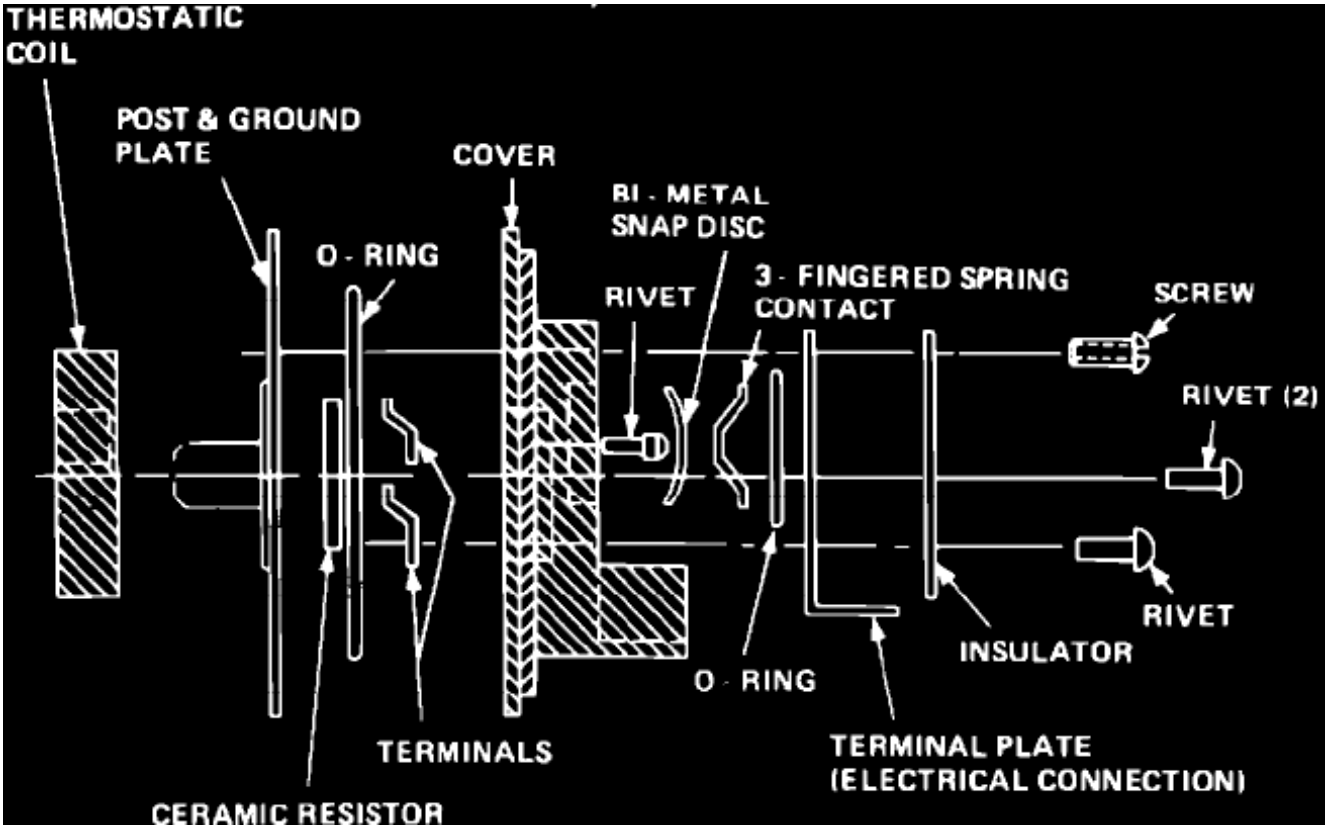
To navigate through these "Cell" references start at the vehicle level and go to: Diagrams / Electrical Diagrams - for a complete list of the diagrams available for the vehicle. Choose the system you are working on and view those diagrams.

Note: If unsure of the system - try utilizing the search feature. Type a component in the search feature that belongs to the system and when the results are displayed note the path displayed. This will show the system the component belongs in.



Choke Thermostat/Heater: Electrical Diagrams

Electrical Diagram of Choke Heater



Choke Thermostat/Heater: Description and Operation

Electric choke assembly exploded view

On most vehicles, an electric assist choke is incorporated onto the carburetor to aid in reducing the emissions of hydrocarbons (HC) and carbon monoxide (CO) during starting and warm-up (choke-on) period. The electric assist choke is designed to give a more rapid choke opening at temperatures of approximately 60-65° F., or greater and a slower choke opening at temperatures of approximately 60-65° F., or below. The electric assist choke system does not change any carburetor service procedures and cannot be adjusted. If the system is out of calibration, the heater control switch and/or choke unit must be replaced. The main components of the electric assist choke system, Fig. 39, consist of a thermostatic coil, ceramic resistor, cover, bi-metal snap disc and contact spring. The electric actuated ceramic resistor heats the thermostatic coil, gradually relaxing coil tension and allowing the choke valve to open. At air temperatures below 50° F., electric current applied to the small section of the ceramic resistor, allows slow opening of the choke valve for good engine warm-up. As the small section of the ceramic resistor continues to heat, a bi-metal disc causes the spring loaded contact to close and apply electric current to the large section of the ceramic resistor which increases the heat flow to the thermostatic coil for more rapid opening of the choke valve. At air temperatures between 50-70° F., electric current applied to the small section, or both the small and large sections of the ceramic resistor, will produce the amount of heat required to control the choke valve position for good engine operation in these temperature ranges. At air temperatures above 70° F., electric current applied to the small section of the ceramic resistor and through the spring contact to the large section of the ceramic resistor, provides rapid heating of the thermostatic coil for quicker choke valve opening when leaner air-fuel mixtures are required at warmer temperatures.

Diagnosis & Testing Possible conditions for the electric choke not operating properly are listed as follows (use a voltmeter to check oil pressure and choke coil circuits):

1. Low or no engine oil pressure.

2. Faulty oil pressure switch.

3. No current to oil pressure switch due to:

a. Burned out fuse. b. Broken wire to oil pressure switch.

4. No current between choke and oil pressure switch due to:

a. Broken lead wire. b. Wire terminal not properly secured on coil terminal. c. Faulty ground circuit between choke assembly and housing grounding plate.

5. Faulty choke coil assembly.

If it is determined that the choke coil assembly is inoperative, the following test must be made:

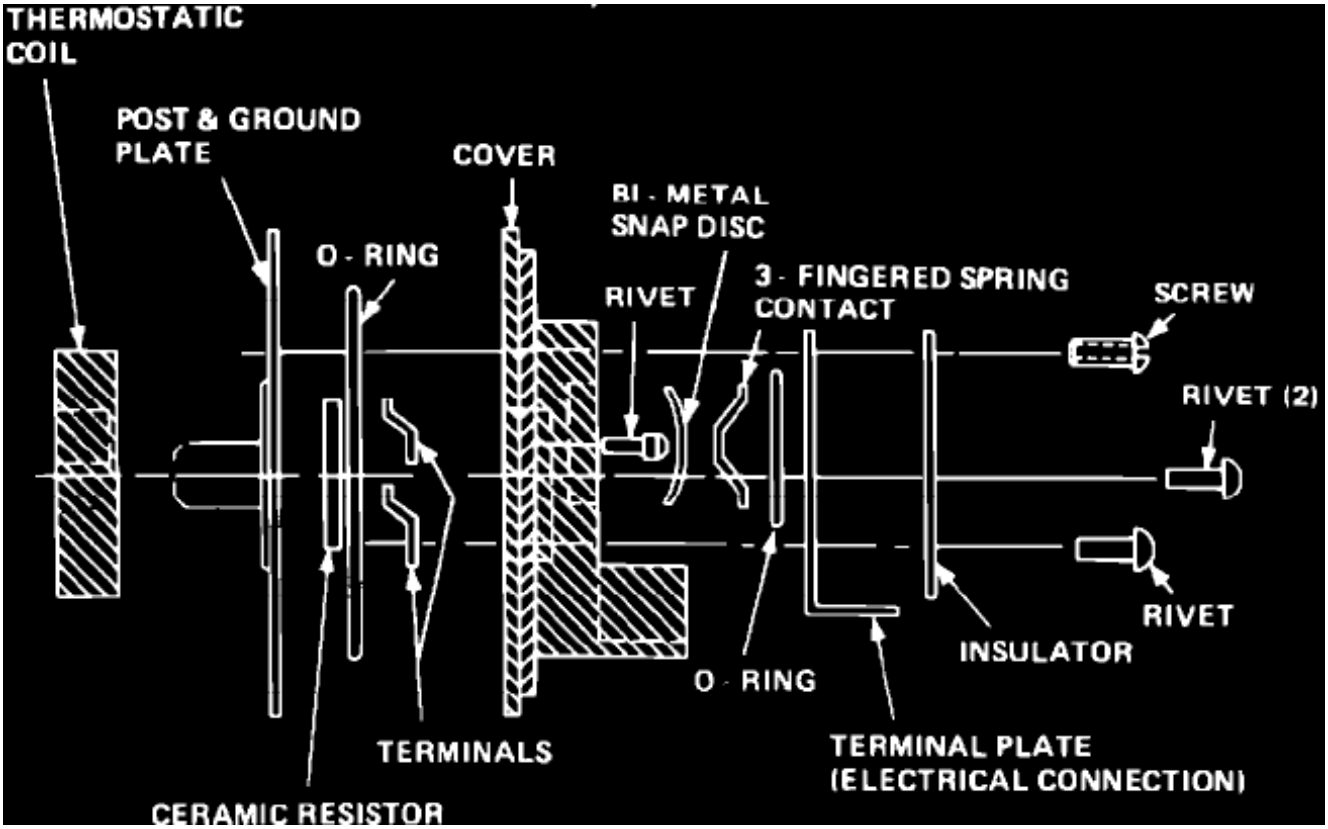
1. Remove choke coil from carburetor. After removal of choke coil, allow coil to cool to room temperature.

2. Connect a ``jumper'' wire between positive battery terminal and choke coil terminal assembly. Connect a second ``jumper'' wire between negative battery terminal and choke coil assembly grounding plate.

3. The tang on the choke coil should rotate 45° in 54-90 seconds.

4. If choke coil does not rotate or exceeds the 54-90 second time limit, replace choke coil.

5. If coil is within specification, check steps 1 thru 5 for possible cause.



Choke Thermostat/Heater: Testing and Inspection

Electric choke assembly exploded view

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4. If choke coil does not rotate or exceeds the 54-90 second time limit, replace choke coil.

5. If coil is within specification, check steps 1 thru 5 for possible cause.

Cold Start Injector: Technical Service Bulletins Fuel System - Cold Start Injector O-Ring Package

Number: 87-153

Section: 6C

Date: JUNE, 1987

Subject: COLD START INJECTOR O-RING PACKAGE

Model and Year: 1985-87 VEHICLES WITH M.P.F.I. ENGINES EQUIPPED WITH COLD START INJECTOR

TO: ALL CHEVROLET DEALERS

Some vehicles with cold start injectors may experience a condition where cold start injector O-ring(s) split or break when servicing the fuel rail assembly. A new service O-ring package, P/N 17111954, is now available through GMSPO. This package contains the cold start valve O-ring seal, cold start body O-ring seal, and the cold start tube O-ring seal.

Use applicable Labor Operation and Time.

Fuel: Customer Interest Fuel System - Factors That Affect Economy/Mileage

Number: 93-96-6C

Section: 6C

Date: FEB. 1993

Corporate Bulletin No.: 306502

ASE No.: A1, A8

Subject: FACTORS THAT AFFECT FUEL ECONOMY

Model and Year: ALL YEARS ALL MODELS

BACKGROUND INFORMATION:

EPA fuel economy estimates are posted on the fuel economy label of all new vehicles. The only intended use of these values is for comparison among the different vehicles. Fuel economy estimates are generated from data taken during a laboratory test using pre-production prototype vehicles under extremely controlled conditions using a professional driver, with the vehicle operating on an instrument similar to a treadmill. The comparisons of current vehicle fuel economy to the EPA fuel economy estimates is a misuse of the information and should be discouraged.

The EPA GAS MILEAGE GUIDE, available at each dealership, points out that the actual mileage when driving a vehicle may differ considerably from the estimated mileage. The guide also describes how vehicles are tested under identical conditions to insure the results can be compared with confidence.

The EPA GAS MILEAGE GUIDE also points out that city fuel economy estimate simulates a 7.5 mile, stop-and-go trip with an average speed of 20 mph. The trip takes 23 minutes and has 18 stops. About 18 percent of the time is spent idling, as in waiting at traffic lights or in rush hour traffic. Two kinds of engine starts are used - the cold start, which is similar to starting a car in the morning after it has been parked all night - and the hot start, similar to restarting a vehicle after it has been warmed up, driven and stopped for a short time.

The test to determine the highway fuel economy estimate represents a mixture of "non-city" driving. Segments corresponding to different kinds of rural roads and interstate highways are included. The test simulates a 10 mile trip and averages 48 mph. The test is run from a hot start and has little idling time and no stops.

The EPA GAS MILEAGE GUIDE explains that the actual test results are adjusted downward to arrive at the estimates used in the booklet and on the labels. City estimates are lowered by 10 percent and the highway estimate by 22 percent from the laboratory test results. The guide also points out that traveling at higher speeds lowers fuel economy and traveling at 65 mph instead of 55 mph lowers fuel economy over 15 percent.

FACTORS THAT AFFECT FUEL ECONOMY:

Axle Ratio

Numerically lower axle ratios generally produce better highway fuel economy. The exception to this is if the engine is "working" exceptionally hard, (heavy vehicle loads pulling a trailer, small engine in a large vehicle ...). In these cases a numerically higher axle may provide better fuel economy. Numerically higher axle ratios will also tend to provide more fuel economy in congested city traffic and stop and go conditions.

Brakes

Brake drag (even a minimal amount undetectable by coasting), can have a significant negative impact on fuel economy. Pull upward on the brake pedal to assure that the stoplight switch and cruise switch at the brake pedal are full and properly adjusted. A "click" sound when the pedal is pulled upward indicates that the switch was improperly adjusted. This causes the front brake pads to lightly rub the rotors, causing a fuel economy loss, without generating excessive heat or brake pad wear.

Driving Habits

Frequent short trips (less than 5 miles), especially in cooler ambient temperatures (less than 65 degrees), will necessitate fuel enrichment on start-ups, especially after "soaks" with the engine off for approximately a half hour or more.

Frequent accelerator pedal movement while driving will reduce fuel economy because of fuel enrichment during the periods of acceleration. Under such driving conditions the torque converter clutch (TCC) also disengages, contributing to fuel economy losses. Prolonged idle periods reduce fuel economy especially in cold ambients when vehicle is allowed to "Warm up".

Fuels

Oxygenated fuels, with methanol and/or ethanol blended into the gasoline have lower energy and thus reduce fuel economy. Typically there is about a 1 MPG penalty for a vehicle which gets 25 to 30 MPG on 100 percent gasoline.

Using fuels of a lower octane than the vehicle was calibrated to will cause increased "KS" Knock Sensor system activity. This will result in a net decrease in spark advance and thus poorer fuel economy. Using fuel of a higher octane than the vehicle was calibrated for WILL NOT increase fuel economy.

Variations in how much fuel is added to the fuel tank during re-fueling can greatly affect calculated fuel economy. These effects decrease as the distance traveled and the number of tank fillups increase.

Green Engine

New vehicles have not yet had an opportunity for the engine to break in, (rings to seat ...). A typical engine will take 3 to 5 thousand miles to break in and during this time period a gradual increase in fuel economy can be expected.

Parasitic Loads

Air conditioning and/or electrical loads, (headlights, heated backglass ...) also result in lower fuel economy, (typically less than 1 MPG difference, each 10 AMPs takes approximately .4 MPG).

Road Conditions

Road surface condition impacts fuel economy. Gravel and/or pot holed roads decrease fuel economy. Hills (vs. level terrain) also negatively impact fuel economy. Even gradual unperceptible increases in elevation result in real measurable decreases in fuel economy. Similarly, driving in the rain or snow decreases fuel economy.

Suspension

Vehicle suspension misalignment can cause poor fuel economy. Check all four tires for abnormal and/or premature tire wear.

New tires, tire rotation, and/or front end alignment may be required to correct fuel economy.

Tires

Performance tires and/or tires with larger "contact areas," (like 60 series aspect ratio), can cause as much as 3 MPG lower fuel economy when compared to hard "thin" tires. Find out if the tire size currently on the car is the same as original equipment. Replacement tires tailor than original equipment tires cause the odometer to read LESS THAN actual distance traveled. This will result in lower calculated fuel economy than actual fuel economy.

Tire Pressure

Harder tires, (more air pressure, or different tire compositions) result in better fuel economy. Do not exceed maximum pressure as labeled on the tire, typically 30-35 psi. The disadvantage of this is that the greater the tire pressure, the harsher the vehicle ride.

Transmission

On 4-Speed automatics, it is possible to drive the vehicle in 3rd gear rather than "overdrive" and not perceive it. Typically this condition occurs when the shift indicator, or the shift linkage/detent is misadjusted. Misadjusted shift linkage can also result in improper signals to the ECM, which can result in less spark advance, and results in a drop in fuel economy.

Driving a vehicle in 3rd gear rather than overdrive at highway speeds typically results in a 3 to 5 MPG penalty.

Torque Converter Clutch operation is essential for good fuel economy. A non-locking torque converter typically results in a 1 to 2 MPG penalty at highway speeds.

Vehicle Weight

Each 125 lbs. of additional weight results in a .3 MPG loss of fuel economy. Thus, additional passengers, luggage ... will decrease fuel economy.

Vehicle Wind Resistance

More wind "DRAG" means less fuel economy. Thus, hang-on luggage carders, cat toppers, open windows and/or open trunk... mean less fuel economy. (See "Driving Habits").

Fuel: Customer Interest Fuels - Effect of Volatility on Driveability

Number: 93-31-6C Section: 6C Date: OCT. 1992 Corporate Bulletin No.: 249128R ASE No.: A1, A8

Subject: EFFECT OF FUEL VOLATILITY ON DRIVEABILITY CONDITIONS

Model and Year: ALL MODEL YEARS, ALL PASSENGER CARS AND TRUCKS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 92-281-6C, DATED SEPT. 1992. THE 1993 MODEL YEAR HAS BEEN ADDED. ALL COPIES OF 92-281-6C SHOULD BE DISCARDED.

Recent changes in EPA regulations have effectively lowered the maximum allowable fuel volatility. Volatility, which can be defined as a gasoline's ability to change from a liquid to a vapor, directly affects the amount of evaporative emissions produced by the fuel. Higher volatility means that more unburned hydrocarbons will be released into the atmosphere. Unfortunately, reducing fuel volatility can cause problems during cold engine operation when low temperatures impede the fuel's ability to vaporize and burn.

Two terms are often used to describe volatility characteristics. These are: -

Distillation Curve A graph showing the relationship between temperature and the percentage of fuel evaporated. The fuel components that boil at relatively low temperatures (below about 90 degrees F) are known as the "light ends", and are essential for good cold engine performance. The "heavy ends", which begin to boil at about 300 degrees F, contain the most energy but are more difficult to burn. Laboratory analysis is usually required to determine the distillation curve of a gasoline sample.

- Reid Vapor Pressure (RVP) RVP is the pressure (psi) that vaporized fuel exerts within a sealed container as it is heated to 100 degrees F. The higher the RVP the higher the fuel volatility. While RVP is readily tested in the field, fuels of the same RVP can have different distillation curves and cold driveability characteristics.

Fuel volatility will vary depending on geographic location and time of year (fuel intended to be used in higher ambient conditions is formulated with less volatility). This can make cold driveability as big a problem during summer months as during the winter. There may be additional variation in the volatility characteristics of pump gasoline, caused by the differences in fuel manufacturers, blends and storage times. As EPA fuel volatility standards are lowered, variations between fuels (which may further reduce volatility) becomes a critical factor influencing cold engine performance. No matter how thoroughly the relationship between fuel quality and cold driveability is understood, eliminating fuel quality as an issue can be difficult, because:

TOOLS WHICH TEST FUEL VOLATILITY MEASURE ONLY RVP, NOT THE DISTILLATION CURVE. -

The distillation curve has a greater effect on cold driveability than RVP.

THE CUSTOMER MAY PERCEIVE RAISING THE FUEL QUALITY ISSUE AS AN ATTEMPT TO EVADE HIS PROBLEM. -

This may cause difficulty in getting accurate fuel usage information.

WATER, AND OTHER TYPES OF FUEL CONTAMINATION, MAY CAUSE CONTINUED DRIVEABILITY COMPLAINTS.

- The problem symptoms may remain even though the vehicle has been refueled several times with a quality gasoline.

CUSTOMER CONCERNS

CONDITION: Poor Cold Engine Operation, symptoms may include; hard start/extended crank, stalling, backfiring, hesitation and/or lack of power.

POSSIBLE CAUSE: Low volatility fuel will not vaporize sufficiently to allow normal combustion.

CORRECTION: Replace Fuel.

DIAGNOSTIC PROCEDURE:

1. Perform basic system checks in section 6E of the service manual.

2. Check for service bulletins which relate to cold driveability issues specific to the problem vehicle.

- An updated engine control calibration, or service procedure, may be available to make the engine less susceptible to low volatility fuels.

3. If basic checks do not reveal a vehicle fault, then advise the customer that fuel quality may be an issue. Recommend the following actions: -

Change brands of fuel

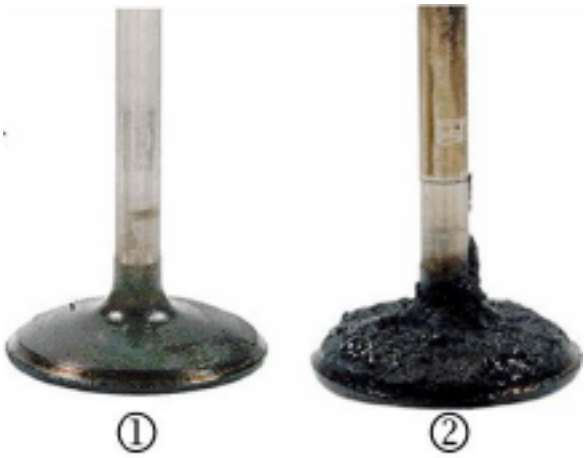
- Use 87 octane gasoline, unless the vehicle is designed for premium gasoline.

- Try to empty the fuel tank as much as practical before refilling.

- Run a minimum of three tanks of new fuel before returning for service.

4. If above steps are ineffective, do not proceed with additional vehicle diagnosis and/or parts replacement until the fuel tank has been drained and refilled with a known good quality gasoline AT THE DEALERSHIP.

5. If the problem remains refer to service manual, service bulletins and/or technical assistance.



Fuel: All Technical Service Bulletins Fuel System - TOP TIER Detergent Gasoline (Canada)

INFORMATION

Bulletin No.: 05-06-04-022G

Date: October 27, 2010

Subject: TOP TIER Detergent Gasoline Information and Available Brands (Deposits, Fuel Economy, No Start, Power, Performance, Stall Concerns) - Canada ONLY

Models:

2011 and Prior GM Passenger Cars and Trucks (Canada Only)

Supercede: This bulletin is being revised to update the model years and include an additional gasoline brand as a TOP TIER source. Please discard Corporate Bulletin Number 05-06-04-022F (Section 06 - Engine/Propulsion System). In the U.S., refer to the latest version of Corporate Bulletin Number 04-06-04-047I.

A new class of fuel called TOP TIER Detergent Gasoline is appearing at retail stations of some fuel marketers. This gasoline meets detergency standards developed by six automotive companies. All vehicles will benefit from using TOP TIER Detergent Gasoline over gasoline containing the "Lowest Additive Concentration" recommended by the Canadian General Standards Board (CGSB). Those vehicles that have experienced deposit related concerns may especially benefit from use of TOP TIER Detergent Gasoline.

Intake valve: 16,093 km (10,000 mi) with TOP TIER Detergent Gasoline

Intake valve: 16,093 km (10,000 mi) with Minimum Additive recommended by the CGSB

Top Tier Fuel Availability

Chevron was the first to offer TOP TIER Detergent Gasoline in Canada. Shell became the first national gasoline retailer to offer TOP TIER Detergent Gasoline across Canada. Petro-Canada began offering TOP TIER Detergent Gasoline nationally as of October 1, 2006. Sunoco began offering TOP TIER Detergent Gasoline in March of 2007. Esso began offering TOP TIER Detergent Gasoline in May of 2010.

Gasoline Brands That Currently Meet TOP TIER Detergent Gasoline Standards

The following gasoline brands meet the TOP TIER Detergent Gasoline Standards in all octane grades :

-

Chevron Canada (markets in British Columbia and western Alberta)

- Shell Canada (nationally)

- Petro-Canada (nationally)

- Sunoco-Canada (Ontario)

- Esso-Canada (nationally)

What is TOP TIER Detergent Gasoline?

TOP TIER Detergent Gasoline is a new class of gasoline with enhanced detergency and no metallic additives. It meets new, voluntary deposit control standards developed by six automotive companies that exceed the detergent recommendations of Canadian standards and does not contain metallic additives, which can damage vehicle emission control components.

Where Can TOP TIER Detergent Gasoline Be Purchased?

The TOP TIER program began in the U.S. and Canada on May 3, 2004. Some fuel marketers have already joined and introduced TOP TIER Detergent Gasoline. This is a voluntary program and not all fuel marketers will offer this product. Once fuel marketers make public announcements, they will appear on a list of brands that meet the TOP TIER standards.

Who developed TOP TIER Detergent Gasoline standards?

TOP TIER Detergent Gasoline standards were developed by six automotive companies: BMW, General Motors, Honda, Toyota, Volkswagen and Audi.

Why was TOP TIER Detergent Gasoline developed?

TOP TIER Detergent Gasoline was developed to increase the level of detergent additive in gasoline. In the U.S., government regulations require that all gasoline sold in the U.S. contain a detergent additive. However, the requirement is minimal and in many cases, is not sufficient to keep engines clean. In Canada, gasoline standards recommend adherence to U.S. detergency requirements but do not require it. In fact, many brands of gasoline in Canada do not contain any detergent additive. In order to meet TOP TIER Detergent Gasoline standards, a higher level of detergent is needed than what is required or recommended, and no metallic additives are allowed. Also, TOP TIER was developed to give fuel marketers the opportunity to differentiate their product.

Why did the six automotive companies join together to develop TOP TIER?

All six corporations recognized the benefits to both the vehicle and the consumer. Also, joining together emphasized that low detergency and the intentional addition of metallic additives is an issue of concern to several automotive companies.

What are the benefits of TOP TIER Detergent Gasoline?

TOP TIER Detergent Gasoline will help keep engines cleaner than gasoline containing the "Lowest Additive Concentration" recommended by Canadian standards. Clean engines help provide optimal fuel economy and engine performance, and also provide reduced emissions. Also, the use of TOP TIER Detergent Gasoline will help reduce deposit related concerns.

Who should use TOP TIER Detergent Gasoline?

All vehicles will benefit from using TOP TIER Detergent Gasoline over gasoline containing the "Lowest Additive Concentration" recommended by Canadian standards. Those vehicles that have experienced deposit related concerns may especially benefit from use of TOP TIER Detergent Gasoline. More information on TOP TIER Detergent Gasoline can be found at this website, http://www.toptiergas.com/.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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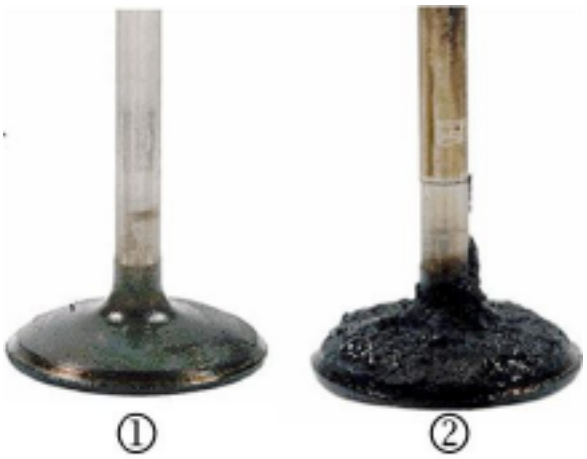
Disclaimer



Fuel: All Technical Service Bulletins Fuel System - 'TOP TIER' Detergent Gasoline Information

INFORMATION

Bulletin No.: 04-06-04-047I

Date: August 17, 2009

Subject: TOP TIER Detergent Gasoline (Deposits, Fuel Economy, No Start, Power, Performance, Stall Concerns) - U.S. Only

Models:

2010 and Prior GM Passenger Cars and Trucks (including Saturn) (U.S. Only) 2003-2010 HUMMER H2 (U.S. Only) 2006-2010 HUMMER H3 (U.S. Only) 2005-2009 Saab 9-7X (U.S. Only)

Supercede: This bulletin is being revised to add model years and additional sources to the Top Tier Fuel Retailers list. Please discard Corporate Bulletin Number 04-06-04-047H (Section 06 - Engine/Propulsion System). In Canada, refer to Corporate Bulletin Number 05-06-04-022F.

A new class of fuel called TOP TIER Detergent Gasoline is appearing at retail stations of some fuel marketers. This gasoline meets detergency standards developed by six automotive companies. All vehicles will benefit from using TOP TIER Detergent Gasoline over gasoline containing the "Lowest Additive Concentration" set by the EPA. Those vehicles that have experienced deposit related concerns may especially benefit from the use of TOP TIER Detergent Gasoline.

Intake valve: - 10,000 miles with TOP TIER Detergent Gasoline

Intake valve: - 10,000 miles with Legal Minimum additive

Gasoline Brands That Currently Meet TOP TIER Detergent Gasoline Standards

As of August 1, 2009, all grades of the following gasoline brands meet the TOP TIER Detergent Gasoline Standards:

- Chevron

- Chevron-Canada

- QuikTrip

- Conoco

-

Phillips 66

- 76

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- Shell

- Shell-Canada

- Entec Stations located in the greater Montgomery, Alabama area.

- MFA Oil Company located throughout Missouri.

- Kwik Trip, Inc. in Minnesota and Wisconsin and Kwik Star convenience stores in Iowa.

-

The Somerset Refinery, Inc. at Somerset Oil stations in Kentucky.

-

Aloha Petroleum

- Tri-Par Oil Company

- Turkey Hill Minit Markets

- Texaco

- Petro-Canada

- Sunoco-Canada

- Road Ranger located in Illinois, Indiana, Iowa, Kentucky, Missouri, Ohio and Wisconsin

What is TOP TIER Detergent Gasoline?

TOP TIER Detergent Gasoline is a new class of gasoline with enhanced detergency. It meets new, voluntary deposit control standards developed by six automotive companies that exceed the detergent requirements imposed by the EPA.

Where Can TOP TIER Detergent Gasoline Be Purchased?

The TOP TIER program began on May 3, 2004 and many fuel marketers have joined the program and have introduced TOP TIER Detergent Gasoline. This is a voluntary program and not all fuel marketers will offer this product. Once fuel marketers make public announcements, they will appear on a list of brands that meet the TOP TIER standards.

Where Can I find the Latest Information on TOP TIER Fuel and Retailers?

On the web, please visit www.toptiergas.com for additional information and updated retailer lists.

Who developed TOP TIER Detergent Gasoline standards?

TOP TIER Detergent Gasoline standards were developed by six automotive companies: Audi, BMW, General Motors, Honda, Toyota and Volkswagen.

Why was TOP TIER Detergent Gasoline developed?

TOP TIER Detergent Gasoline was developed to increase the level of detergent additive in gasoline. The EPA requires that all gasoline sold in the U.S. contain a detergent additive. However, the requirement is minimal and in many cases, is not sufficient to keep engines clean. In order to meet TOP TIER Detergent Gasoline standards, a higher level of detergent is needed than what is required by the EPA. Also, TOP TIER was developed to give fuel marketers the opportunity to differentiate their product.

Why did the six automotive companies join together to develop TOP TIER?

All six corporations recognized the benefits to both the vehicle and the consumer. Also, joining together emphasized that low detergency is an issue of concern to several automotive companies.

What are the benefits of TOP TIER Detergent Gasoline?

TOP TIER Detergent Gasoline will help keep engines cleaner than gasoline containing the "Lowest Additive Concentration" set by the EPA. Clean engines help provide optimal fuel economy and performance and reduced emissions. Also, use of TOP TIER Detergent Gasoline will help reduce deposit related concerns.

Disclaimer

FILE IN SECTION: 0 - General Information

BULLETIN NO.: 57-01-02

DATE: June, 1995

SUBJECT: Reformulated Gasoline (RFG), Oxygenated Gasoline and California Phase 2 RFG

MODELS: 1995 and Prior Passenger Cars and Trucks

General Motors customers will be potentially exposed to a variety of different fuel types. Besides the conventional gasoline available, new types such as Reformulated Gasoline (RFG), oxygenated gasoline, and starting in 1996, California Phase 2 RFG. Reformulated Gasoline (RFG) is blended to burn more cleanly and not to evaporate as readily. RFG must contain a minimum of 2 percent oxygen, which is usually achieved with ethanol or EPA-approved ethers such as methyl tertiary-butyl ether (MTBE). This type of fuel is required by the Clean Air Act in the nine worst ozone non-attainment areas of the country, and may also be required in other areas designated ozone non-attainment, at the option of the states. RFG is intended to produce approximately 15 percent less pollution than conventional gasoline. Using RFG should reduce the total health risk to the public by reducing exposure to ozone and air toxins. General Motors supports the use of RFG as a cost effective means of providing air quality benefits.

Oxygenated gasolines are prevalent in the wintertime for Carbon Monoxide (CO) non-attainment areas. These fuels contain oxygen components similar to RFG. Approximately 50 percent of the fuel sold in the U.S. in the wintertime contains an oxygenate component.

Vehicle fuel economy may be slightly reduced, if at all, by the use of gasoline containing oxygenates. Fuel economy is most affected by engine and vehicle type, driving habits, weather conditions, and vehicle maintenance.

Properly blended RFG, oxygenated gasoline, and California Phase 2 RFG will have no adverse effect on vehicle performance or to the durability of engine and fuel system components. In fact, the General Motors Owner's Manual fuel statements have consistently permitted the use of properly blended fuels containing up to 10 percent ethanol (since 1980) and up to 15 percent methyl tertiary-butyl ether (MTBE) for current and all past model year vehicles. These statements continue to be valid. The use of oxygenate-containing fuels will not invalidate the GM vehicle warranty.

Number: 93-96-6C

Section: 6C

Date: FEB. 1993

Corporate Bulletin No.: 306502

ASE No.: A1, A8

Subject: FACTORS THAT AFFECT FUEL ECONOMY

Model and Year: ALL YEARS ALL MODELS

BACKGROUND INFORMATION:

EPA fuel economy estimates are posted on the fuel economy label of all new vehicles. The only intended use of these values is for comparison among the different vehicles. Fuel economy estimates are generated from data taken during a laboratory test using pre-production prototype vehicles under extremely controlled conditions using a professional driver, with the vehicle operating on an instrument similar to a treadmill. The comparisons of current vehicle fuel economy to the EPA fuel economy estimates is a misuse of the information and should be discouraged.

The EPA GAS MILEAGE GUIDE, available at each dealership, points out that the actual mileage when driving a vehicle may differ considerably from the estimated mileage. The guide also describes how vehicles are tested under identical conditions to insure the results can be compared with confidence.

The EPA GAS MILEAGE GUIDE also points out that city fuel economy estimate simulates a 7.5 mile, stop-and-go trip with an average speed of 20 mph. The trip takes 23 minutes and has 18 stops. About 18 percent of the time is spent idling, as in waiting at traffic lights or in rush hour traffic. Two kinds of engine starts are used - the cold start, which is similar to starting a car in the morning after it has been parked all night - and the hot start, similar to restarting a vehicle after it has been warmed up, driven and stopped for a short time.

The test to determine the highway fuel economy estimate represents a mixture of "non-city" driving. Segments corresponding to different kinds of rural roads and interstate highways are included. The test simulates a 10 mile trip and averages 48 mph. The test is run from a hot start and has little idling time and no stops.

The EPA GAS MILEAGE GUIDE explains that the actual test results are adjusted downward to arrive at the estimates used in the booklet and on the labels. City estimates are lowered by 10 percent and the highway estimate by 22 percent from the laboratory test results. The guide also points out that traveling at higher speeds lowers fuel economy and traveling at 65 mph instead of 55 mph lowers fuel economy over 15 percent.

FACTORS THAT AFFECT FUEL ECONOMY:

Axle Ratio

Numerically lower axle ratios generally produce better highway fuel economy. The exception to this is if the engine is "working" exceptionally hard, (heavy vehicle loads pulling a trailer, small engine in a large vehicle ...). In these cases a numerically higher axle may provide better fuel economy. Numerically higher axle ratios will also tend to provide more fuel economy in congested city traffic and stop and go conditions.

Brakes

Brake drag (even a minimal amount undetectable by coasting), can have a significant negative impact on fuel economy. Pull upward on the brake pedal to assure that the stoplight switch and cruise switch at the brake pedal are full and properly adjusted. A "click" sound when the pedal is pulled upward indicates that the switch was improperly adjusted. This causes the front brake pads to lightly rub the rotors, causing a fuel economy loss, without generating excessive heat or brake pad wear.

Driving Habits

Frequent short trips (less than 5 miles), especially in cooler ambient temperatures (less than 65 degrees), will necessitate fuel enrichment on start-ups, especially after "soaks" with the engine off for approximately a half hour or more.

Frequent accelerator pedal movement while driving will reduce fuel economy because of fuel enrichment during the periods of acceleration. Under such driving conditions the torque converter clutch (TCC) also disengages, contributing to fuel economy losses. Prolonged idle periods reduce fuel economy especially in cold ambients when vehicle is allowed to "Warm up".

Fuels

Oxygenated fuels, with methanol and/or ethanol blended into the gasoline have lower energy and thus reduce fuel economy. Typically there is about a 1 MPG penalty for a vehicle which gets 25 to 30 MPG on 100 percent gasoline.

Using fuels of a lower octane than the vehicle was calibrated to will cause increased "KS" Knock Sensor system activity. This will result in a net decrease in spark advance and thus poorer fuel economy. Using fuel of a higher octane than the vehicle was calibrated for WILL NOT increase fuel economy.

Variations in how much fuel is added to the fuel tank during re-fueling can greatly affect calculated fuel economy. These effects decrease as the distance traveled and the number of tank fillups increase.

Green Engine

New vehicles have not yet had an opportunity for the engine to break in, (rings to seat ...). A typical engine will take 3 to 5 thousand miles to break in and during this time period a gradual increase in fuel economy can be expected.

Parasitic Loads

Air conditioning and/or electrical loads, (headlights, heated backglass ...) also result in lower fuel economy, (typically less than 1 MPG difference, each 10 AMPs takes approximately .4 MPG).

Road Conditions

Road surface condition impacts fuel economy. Gravel and/or pot holed roads decrease fuel economy. Hills (vs. level terrain) also negatively impact fuel economy. Even gradual unperceptible increases in elevation result in real measurable decreases in fuel economy. Similarly, driving in the rain or snow decreases fuel economy.

Suspension

Vehicle suspension misalignment can cause poor fuel economy. Check all four tires for abnormal and/or premature tire wear.

New tires, tire rotation, and/or front end alignment may be required to correct fuel economy.

Tires

Performance tires and/or tires with larger "contact areas," (like 60 series aspect ratio), can cause as much as 3 MPG lower fuel economy when compared to hard "thin" tires. Find out if the tire size currently on the car is the same as original equipment. Replacement tires tailor than original equipment tires cause the odometer to read LESS THAN actual distance traveled. This will result in lower calculated fuel economy than actual fuel economy.

Tire Pressure

Harder tires, (more air pressure, or different tire compositions) result in better fuel economy. Do not exceed maximum pressure as labeled on the tire, typically 30-35 psi. The disadvantage of this is that the greater the tire pressure, the harsher the vehicle ride.

Transmission

On 4-Speed automatics, it is possible to drive the vehicle in 3rd gear rather than "overdrive" and not perceive it. Typically this condition occurs when the shift indicator, or the shift linkage/detent is misadjusted. Misadjusted shift linkage can also result in improper signals to the ECM, which can result in less spark advance, and results in a drop in fuel economy.

Driving a vehicle in 3rd gear rather than overdrive at highway speeds typically results in a 3 to 5 MPG penalty.

Torque Converter Clutch operation is essential for good fuel economy. A non-locking torque converter typically results in a 1 to 2 MPG penalty at highway speeds.

Vehicle Weight

Each 125 lbs. of additional weight results in a .3 MPG loss of fuel economy. Thus, additional passengers, luggage ... will decrease fuel economy.

Vehicle Wind Resistance

More wind "DRAG" means less fuel economy. Thus, hang-on luggage carders, cat toppers, open windows and/or open trunk... mean less fuel economy. (See "Driving Habits").

Number: 93-31-6C Section: 6C Date: OCT. 1992 Corporate Bulletin No.: 249128R ASE No.: A1, A8

Subject: EFFECT OF FUEL VOLATILITY ON DRIVEABILITY CONDITIONS

Model and Year: ALL MODEL YEARS, ALL PASSENGER CARS AND TRUCKS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 92-281-6C, DATED SEPT. 1992. THE 1993 MODEL YEAR HAS BEEN ADDED. ALL COPIES OF 92-281-6C SHOULD BE DISCARDED.

Recent changes in EPA regulations have effectively lowered the maximum allowable fuel volatility. Volatility, which can be defined as a gasoline's ability to change from a liquid to a vapor, directly affects the amount of evaporative emissions produced by the fuel. Higher volatility means that more unburned hydrocarbons will be released into the atmosphere. Unfortunately, reducing fuel volatility can cause problems during cold engine operation when low temperatures impede the fuel's ability to vaporize and burn.

Two terms are often used to describe volatility characteristics. These are: -

Distillation Curve A graph showing the relationship between temperature and the percentage of fuel evaporated. The fuel components that boil at relatively low temperatures (below about 90 degrees F) are known as the "light ends", and are essential for good cold engine performance. The "heavy ends", which begin to boil at about 300 degrees F, contain the most energy but are more difficult to burn. Laboratory analysis is usually required to determine the distillation curve of a gasoline sample.

- Reid Vapor Pressure (RVP) RVP is the pressure (psi) that vaporized fuel exerts within a sealed container as it is heated to 100 degrees F. The higher the RVP the higher the fuel volatility. While RVP is readily tested in the field, fuels of the same RVP can have different distillation curves and cold driveability characteristics.

Fuel volatility will vary depending on geographic location and time of year (fuel intended to be used in higher ambient conditions is formulated with less volatility). This can make cold driveability as big a problem during summer months as during the winter. There may be additional variation in the volatility characteristics of pump gasoline, caused by the differences in fuel manufacturers, blends and storage times. As EPA fuel volatility standards are lowered, variations between fuels (which may further reduce volatility) becomes a critical factor influencing cold engine performance. No matter how thoroughly the relationship between fuel quality and cold driveability is understood, eliminating fuel quality as an issue can be difficult, because:

TOOLS WHICH TEST FUEL VOLATILITY MEASURE ONLY RVP, NOT THE DISTILLATION CURVE. -

The distillation curve has a greater effect on cold driveability than RVP.

THE CUSTOMER MAY PERCEIVE RAISING THE FUEL QUALITY ISSUE AS AN ATTEMPT TO EVADE HIS PROBLEM. -

This may cause difficulty in getting accurate fuel usage information.

WATER, AND OTHER TYPES OF FUEL CONTAMINATION, MAY CAUSE CONTINUED DRIVEABILITY COMPLAINTS.

- The problem symptoms may remain even though the vehicle has been refueled several times with a quality gasoline.

CUSTOMER CONCERNS

CONDITION: Poor Cold Engine Operation, symptoms may include; hard start/extended crank, stalling, backfiring, hesitation and/or lack of power.

POSSIBLE CAUSE: Low volatility fuel will not vaporize sufficiently to allow normal combustion.

CORRECTION: Replace Fuel.

DIAGNOSTIC PROCEDURE:

1. Perform basic system checks in section 6E of the service manual.

2. Check for service bulletins which relate to cold driveability issues specific to the problem vehicle.

- An updated engine control calibration, or service procedure, may be available to make the engine less susceptible to low volatility fuels.

3. If basic checks do not reveal a vehicle fault, then advise the customer that fuel quality may be an issue. Recommend the following actions: -

Change brands of fuel

- Use 87 octane gasoline, unless the vehicle is designed for premium gasoline.

- Try to empty the fuel tank as much as practical before refilling.

- Run a minimum of three tanks of new fuel before returning for service.

4. If above steps are ineffective, do not proceed with additional vehicle diagnosis and/or parts replacement until the fuel tank has been drained and refilled with a known good quality gasoline AT THE DEALERSHIP.

5. If the problem remains refer to service manual, service bulletins and/or technical assistance.

Number: 89-268-08

Section: 0B

Date: October 1989

Corporate Bulletin No.: 930108

Subject: USE OF GASOLINE CONTAINING 15 PERCENT MTBE

Model and Year: ALL 1980-89 PASSENGER CARS AND LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

In August of the U.S. Environmental Protection Agency approved the use of methyltertiary-butyl ether (MTBE) in gasolines at concentrations of 15 percent or Prior to that time, the legal limit was 11 percent; Generai Motors owners manuals stated that the use of gasolines containing 11 percent or less MTBE should not adversely affect the operation of the vehicle and would be covered by the New Vehicle and Emission Control Systems Warranties. The use of 15 percent MTBE in gasoline should also not adversely affect the operation of 1989 and earlier model vehicles and therefore, will not void any warranties covering those vehicles. In the interest of contributing to cleaner air, General Motors recommends that all model year vehicles use such fuels whenever available. The 1990 and future owners manuals will reflect this position.

Fuel: All Technical Service Bulletins Fuel Additive - Prevents Exhaust Valve Recession

Number: 86-260-OA

Section: OA

Date: MAY, 1988

Subject: GASOLINE ADDITIVE FOR PREVENTING EXHAUST VALVE RECESSION

Model and Year: PRE-1971 PASSENGER CARS AND TRUCKS, 1971-1978 TRUCKS OVER 6,000 LBS. GVW, 1979-1986 TRUCKS OVER 8,000 LBS. GVW

TO: ALL CHEVROLET DEALERS

Some engines designed to use leaded gasoline may experience exhaust valve recession if operated at high speeds and loads with unleaded gasoline. Therefore, if leaded-gasoline is not available, or if additional protection is desired with low-lead gasoline, the GM Anti-Valve-Recession Additive, Part Number 12345492, may be used. The recommended dosage is one container per tankful (20 gallons) of unleaded gasoline, which should provide valve protection equivalent to leaded gasoline with a lead concentration of 0.1 grams per gallon.

This additive can be used in all GM gasoline-fueled engines in:

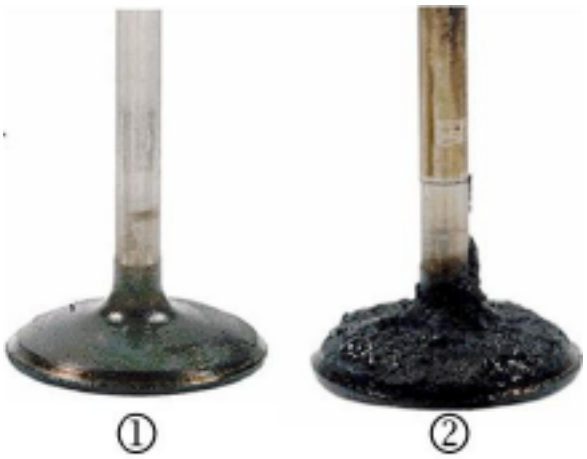
(a) pre-1971 passenger cars and trucks

(b) 1971-1978 trucks over 6,000 lbs. GVW

(c) 1979-1986 trucks over 8,000 lbs. GVW.

NOTE: Additive should not be used in engines designed to operate exclusively on unleaded gasoline (with restriction in fuel tank filler neck).

As a reminder, the engines mentioned above were designed to use a fuel with a minimum octane rating of 89, (R+M)/2 (average of Research and Motor octane numbers). If unleaded fuel is used, be sure that it has an octane rating of at least 89 (R+M)/2.



Fuel: All Technical Service Bulletins Fuel System - TOP TIER Detergent Gasoline (Canada)

INFORMATION

Bulletin No.: 05-06-04-022G

Date: October 27, 2010

Subject: TOP TIER Detergent Gasoline Information and Available Brands (Deposits, Fuel Economy, No Start, Power, Performance, Stall Concerns) - Canada ONLY

Models:

2011 and Prior GM Passenger Cars and Trucks (Canada Only)

Supercede: This bulletin is being revised to update the model years and include an additional gasoline brand as a TOP TIER source. Please discard Corporate Bulletin Number 05-06-04-022F (Section 06 - Engine/Propulsion System). In the U.S., refer to the latest version of Corporate Bulletin Number 04-06-04-047I.

A new class of fuel called TOP TIER Detergent Gasoline is appearing at retail stations of some fuel marketers. This gasoline meets detergency standards developed by six automotive companies. All vehicles will benefit from using TOP TIER Detergent Gasoline over gasoline containing the "Lowest Additive Concentration" recommended by the Canadian General Standards Board (CGSB). Those vehicles that have experienced deposit related concerns may especially benefit from use of TOP TIER Detergent Gasoline.

Intake valve: 16,093 km (10,000 mi) with TOP TIER Detergent Gasoline

Intake valve: 16,093 km (10,000 mi) with Minimum Additive recommended by the CGSB

Top Tier Fuel Availability

Chevron was the first to offer TOP TIER Detergent Gasoline in Canada. Shell became the first national gasoline retailer to offer TOP TIER Detergent Gasoline across Canada. Petro-Canada began offering TOP TIER Detergent Gasoline nationally as of October 1, 2006. Sunoco began offering TOP TIER Detergent Gasoline in March of 2007. Esso began offering TOP TIER Detergent Gasoline in May of 2010.

Gasoline Brands That Currently Meet TOP TIER Detergent Gasoline Standards

The following gasoline brands meet the TOP TIER Detergent Gasoline Standards in all octane grades :

-

Chevron Canada (markets in British Columbia and western Alberta)

- Shell Canada (nationally)

- Petro-Canada (nationally)

- Sunoco-Canada (Ontario)

- Esso-Canada (nationally)

What is TOP TIER Detergent Gasoline?

TOP TIER Detergent Gasoline is a new class of gasoline with enhanced detergency and no metallic additives. It meets new, voluntary deposit control standards developed by six automotive companies that exceed the detergent recommendations of Canadian standards and does not contain metallic additives, which can damage vehicle emission control components.

Where Can TOP TIER Detergent Gasoline Be Purchased?

The TOP TIER program began in the U.S. and Canada on May 3, 2004. Some fuel marketers have already joined and introduced TOP TIER Detergent Gasoline. This is a voluntary program and not all fuel marketers will offer this product. Once fuel marketers make public announcements, they will appear on a list of brands that meet the TOP TIER standards.

Who developed TOP TIER Detergent Gasoline standards?

TOP TIER Detergent Gasoline standards were developed by six automotive companies: BMW, General Motors, Honda, Toyota, Volkswagen and Audi.

Why was TOP TIER Detergent Gasoline developed?

TOP TIER Detergent Gasoline was developed to increase the level of detergent additive in gasoline. In the U.S., government regulations require that all gasoline sold in the U.S. contain a detergent additive. However, the requirement is minimal and in many cases, is not sufficient to keep engines clean. In Canada, gasoline standards recommend adherence to U.S. detergency requirements but do not require it. In fact, many brands of gasoline in Canada do not contain any detergent additive. In order to meet TOP TIER Detergent Gasoline standards, a higher level of detergent is needed than what is required or recommended, and no metallic additives are allowed. Also, TOP TIER was developed to give fuel marketers the opportunity to differentiate their product.

Why did the six automotive companies join together to develop TOP TIER?

All six corporations recognized the benefits to both the vehicle and the consumer. Also, joining together emphasized that low detergency and the intentional addition of metallic additives is an issue of concern to several automotive companies.

What are the benefits of TOP TIER Detergent Gasoline?

TOP TIER Detergent Gasoline will help keep engines cleaner than gasoline containing the "Lowest Additive Concentration" recommended by Canadian standards. Clean engines help provide optimal fuel economy and engine performance, and also provide reduced emissions. Also, the use of TOP TIER Detergent Gasoline will help reduce deposit related concerns.

Who should use TOP TIER Detergent Gasoline?

All vehicles will benefit from using TOP TIER Detergent Gasoline over gasoline containing the "Lowest Additive Concentration" recommended by Canadian standards. Those vehicles that have experienced deposit related concerns may especially benefit from use of TOP TIER Detergent Gasoline. More information on TOP TIER Detergent Gasoline can be found at this website, http://www.toptiergas.com/.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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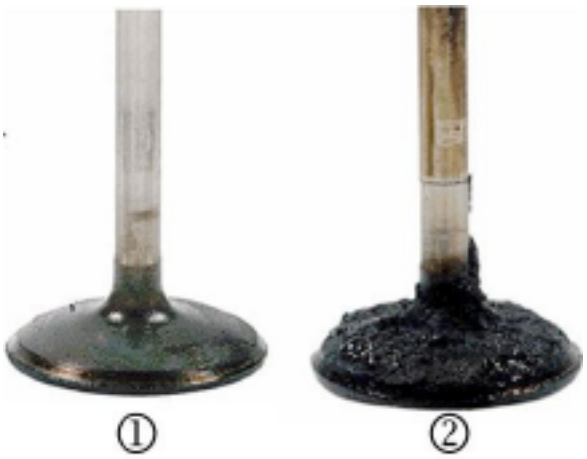

Fuel: All Technical Service Bulletins Fuel System - 'TOP TIER' Detergent Gasoline Information

INFORMATION

Bulletin No.: 04-06-04-047I

Date: August 17, 2009

Subject: TOP TIER Detergent Gasoline (Deposits, Fuel Economy, No Start, Power, Performance, Stall Concerns) - U.S. Only

Models:

2010 and Prior GM Passenger Cars and Trucks (including Saturn) (U.S. Only) 2003-2010 HUMMER H2 (U.S. Only) 2006-2010 HUMMER H3 (U.S. Only) 2005-2009 Saab 9-7X (U.S. Only)

Supercede: This bulletin is being revised to add model years and additional sources to the Top Tier Fuel Retailers list. Please discard Corporate Bulletin Number 04-06-04-047H (Section 06 - Engine/Propulsion System). In Canada, refer to Corporate Bulletin Number 05-06-04-022F.

A new class of fuel called TOP TIER Detergent Gasoline is appearing at retail stations of some fuel marketers. This gasoline meets detergency standards developed by six automotive companies. All vehicles will benefit from using TOP TIER Detergent Gasoline over gasoline containing the "Lowest Additive Concentration" set by the EPA. Those vehicles that have experienced deposit related concerns may especially benefit from the use of TOP TIER Detergent Gasoline.

Intake valve: - 10,000 miles with TOP TIER Detergent Gasoline

Intake valve: - 10,000 miles with Legal Minimum additive

Gasoline Brands That Currently Meet TOP TIER Detergent Gasoline Standards

As of August 1, 2009, all grades of the following gasoline brands meet the TOP TIER Detergent Gasoline Standards:

- Chevron

- Chevron-Canada

- QuikTrip

- Conoco

-

Phillips 66

- 76

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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- Shell

- Shell-Canada

- Entec Stations located in the greater Montgomery, Alabama area.

- MFA Oil Company located throughout Missouri.

- Kwik Trip, Inc. in Minnesota and Wisconsin and Kwik Star convenience stores in Iowa.

-

The Somerset Refinery, Inc. at Somerset Oil stations in Kentucky.

-

Aloha Petroleum

- Tri-Par Oil Company

- Turkey Hill Minit Markets

- Texaco

- Petro-Canada

- Sunoco-Canada

- Road Ranger located in Illinois, Indiana, Iowa, Kentucky, Missouri, Ohio and Wisconsin

What is TOP TIER Detergent Gasoline?

TOP TIER Detergent Gasoline is a new class of gasoline with enhanced detergency. It meets new, voluntary deposit control standards developed by six automotive companies that exceed the detergent requirements imposed by the EPA.

Where Can TOP TIER Detergent Gasoline Be Purchased?

The TOP TIER program began on May 3, 2004 and many fuel marketers have joined the program and have introduced TOP TIER Detergent Gasoline. This is a voluntary program and not all fuel marketers will offer this product. Once fuel marketers make public announcements, they will appear on a list of brands that meet the TOP TIER standards.

Where Can I find the Latest Information on TOP TIER Fuel and Retailers?

On the web, please visit www.toptiergas.com for additional information and updated retailer lists.

Who developed TOP TIER Detergent Gasoline standards?

TOP TIER Detergent Gasoline standards were developed by six automotive companies: Audi, BMW, General Motors, Honda, Toyota and Volkswagen.

Why was TOP TIER Detergent Gasoline developed?

TOP TIER Detergent Gasoline was developed to increase the level of detergent additive in gasoline. The EPA requires that all gasoline sold in the U.S. contain a detergent additive. However, the requirement is minimal and in many cases, is not sufficient to keep engines clean. In order to meet TOP TIER Detergent Gasoline standards, a higher level of detergent is needed than what is required by the EPA. Also, TOP TIER was developed to give fuel marketers the opportunity to differentiate their product.

Why did the six automotive companies join together to develop TOP TIER?

All six corporations recognized the benefits to both the vehicle and the consumer. Also, joining together emphasized that low detergency is an issue of concern to several automotive companies.

What are the benefits of TOP TIER Detergent Gasoline?

TOP TIER Detergent Gasoline will help keep engines cleaner than gasoline containing the "Lowest Additive Concentration" set by the EPA. Clean engines help provide optimal fuel economy and performance and reduced emissions. Also, use of TOP TIER Detergent Gasoline will help reduce deposit related concerns.

Disclaimer

FILE IN SECTION: 0 - General Information

BULLETIN NO.: 57-01-02

DATE: June, 1995

SUBJECT: Reformulated Gasoline (RFG), Oxygenated Gasoline and California Phase 2 RFG

MODELS: 1995 and Prior Passenger Cars and Trucks

General Motors customers will be potentially exposed to a variety of different fuel types. Besides the conventional gasoline available, new types such as Reformulated Gasoline (RFG), oxygenated gasoline, and starting in 1996, California Phase 2 RFG. Reformulated Gasoline (RFG) is blended to burn more cleanly and not to evaporate as readily. RFG must contain a minimum of 2 percent oxygen, which is usually achieved with ethanol or EPA-approved ethers such as methyl tertiary-butyl ether (MTBE). This type of fuel is required by the Clean Air Act in the nine worst ozone non-attainment areas of the country, and may also be required in other areas designated ozone non-attainment, at the option of the states. RFG is intended to produce approximately 15 percent less pollution than conventional gasoline. Using RFG should reduce the total health risk to the public by reducing exposure to ozone and air toxins. General Motors supports the use of RFG as a cost effective means of providing air quality benefits.

Oxygenated gasolines are prevalent in the wintertime for Carbon Monoxide (CO) non-attainment areas. These fuels contain oxygen components similar to RFG. Approximately 50 percent of the fuel sold in the U.S. in the wintertime contains an oxygenate component.

Vehicle fuel economy may be slightly reduced, if at all, by the use of gasoline containing oxygenates. Fuel economy is most affected by engine and vehicle type, driving habits, weather conditions, and vehicle maintenance.

Properly blended RFG, oxygenated gasoline, and California Phase 2 RFG will have no adverse effect on vehicle performance or to the durability of engine and fuel system components. In fact, the General Motors Owner's Manual fuel statements have consistently permitted the use of properly blended fuels containing up to 10 percent ethanol (since 1980) and up to 15 percent methyl tertiary-butyl ether (MTBE) for current and all past model year vehicles. These statements continue to be valid. The use of oxygenate-containing fuels will not invalidate the GM vehicle warranty.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Fuel Delivery and Air Induction > Fuel > Component Information > Technical Service Bulletins > All Other Service Bulletins for Fuel: > 892680B > Oct > 89 > Fuel - Use of Gasoline Containing 15 Percent MTBE

Number: 89-268-08

Section: 0B

Date: October 1989

Corporate Bulletin No.: 930108

Subject: USE OF GASOLINE CONTAINING 15 PERCENT MTBE

Model and Year: ALL 1980-89 PASSENGER CARS AND LIGHT DUTY TRUCKS

TO: ALL CHEVROLET DEALERS

In August of the U.S. Environmental Protection Agency approved the use of methyltertiary-butyl ether (MTBE) in gasolines at concentrations of 15 percent or Prior to that time, the legal limit was 11 percent; Generai Motors owners manuals stated that the use of gasolines containing 11 percent or less MTBE should not adversely affect the operation of the vehicle and would be covered by the New Vehicle and Emission Control Systems Warranties. The use of 15 percent MTBE in gasoline should also not adversely affect the operation of 1989 and earlier model vehicles and therefore, will not void any warranties covering those vehicles. In the interest of contributing to cleaner air, General Motors recommends that all model year vehicles use such fuels whenever available. The 1990 and future owners manuals will reflect this position.

Fuel: All Technical Service Bulletins Fuel Additive - Prevents Exhaust Valve Recession

Number: 86-260-OA

Section: OA

Date: MAY, 1988

Subject: GASOLINE ADDITIVE FOR PREVENTING EXHAUST VALVE RECESSION

Model and Year: PRE-1971 PASSENGER CARS AND TRUCKS, 1971-1978 TRUCKS OVER 6,000 LBS. GVW, 1979-1986 TRUCKS OVER 8,000 LBS. GVW

TO: ALL CHEVROLET DEALERS

Some engines designed to use leaded gasoline may experience exhaust valve recession if operated at high speeds and loads with unleaded gasoline. Therefore, if leaded-gasoline is not available, or if additional protection is desired with low-lead gasoline, the GM Anti-Valve-Recession Additive, Part Number 12345492, may be used. The recommended dosage is one container per tankful (20 gallons) of unleaded gasoline, which should provide valve protection equivalent to leaded gasoline with a lead concentration of 0.1 grams per gallon.

This additive can be used in all GM gasoline-fueled engines in:

(a) pre-1971 passenger cars and trucks

(b) 1971-1978 trucks over 6,000 lbs. GVW

(c) 1979-1986 trucks over 8,000 lbs. GVW.

NOTE: Additive should not be used in engines designed to operate exclusively on unleaded gasoline (with restriction in fuel tank filler neck).

As a reminder, the engines mentioned above were designed to use a fuel with a minimum octane rating of 89, (R+M)/2 (average of Research and Motor octane numbers). If unleaded fuel is used, be sure that it has an octane rating of at least 89 (R+M)/2.

Fuel Filler Cap: Description and Operation

The filler cap used on the EEC system is not vented under normal conditions. However, to prevent damage to the tank from excessive internal or external pressure resulting from the closed system, the filler cap contains a two-way relief valve which allows the cap to vent when abnormal pressure or vacuum develops within the tank. Installation of a fill cap from a non-emission fuel tank will render the system inoperative, since the non-emission fill cap is vented and the system must be sealed to function properly. Also if a non-vented fill cap is installed on a conventional tank, the result will be a serious deformation or a total collapse of the fuel tank.

Fuel Pressure Release: Service and Repair

Throttle Body Injected Engines

1. Remove fuel pump fuse from fuse box. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and replace fuel pump fuse.

Port Injected Engines

1. Disconnect fuel tank harness connector. 2. Start engine and allow to run until supply of fuel in pipes is depleted. 3. Crank engine an additional 3 seconds to ensure relief of any additional fuel pressure. 4. Turn ignition Off and reconnect fuel tank harness connector.

GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.

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Fuel Injector: Technical Service Bulletins Fuel System - Fuel Injector Maintenance Cleaning

Bulletin No.: 04-06-04-051B

Date: January 04, 2006

INFORMATION

Subject: Maintenance Cleaning of Fuel Injectors

Models: 2006 and Prior All General Motors Passenger Cars and Trucks 2003-2006 HUMMER H2 2006 HUMMER H3

Supercede:

This bulletin is being revised to add models and model years and update the name and part number of GM Fuel System Treatment. Please discard Corporate Bulletin Number 04-06-04-051A (Section 06 - Engine/Propulsion System).

General Motors is aware that some companies are marketing tools, equipment and programs to support fuel injector cleaning as a preventative maintenance procedure. General Motors does not endorse, support or acknowledge the need for fuel injector cleaning as a preventative maintenance procedure. Fuel injector cleaning is approved only when performed as directed by a published GM driveability or DTC diagnostic service procedure.

Due to variation in fuel quality in different areas of the country, the only preventative maintenance currently endorsed by GM regarding its gasoline engine fuel systems is the addition of GM Fuel System Treatment PLUS, P/N 88861011 (for U.S. ACDelco(R), use P/N 88861013) (in Canada, P/N 88861012), added to a tank of fuel at each oil change. Refer to Corporate Bulletin Number 03-06-04-030A for proper cleaning instructions.

Disclaimer

Fuel Injector: Technical Service Bulletins Tools - Introduction Of The Fuel Injector Tester

NO.: 93-I-39 DATE: June, 1993 GROUP: 6 CORP. NO.: 316501R

SUBJECT: INFORMATION ON THE INTRODUCTION OF THE FUEL INJECTOR TESTER TOOL J - 39021

This bulletin is being revised to add information about the coil test and a list of driveability problems.

In February, 1993, Kent-Moore shipped a new Fuel Injector Tester, tool J-39021, as part of the Essential Tool Program. This tool has the capability of performing injector balance and coil tests on all GM and many non-GM fuel injection systems. The injector balance test is one familiar to most technicians where fuel pressure drop is measured as an injector is energized for a set period of time. This fuel pressure drop is compared to that of the other injectors in the vehicle or a published standard.

The injector coil test is a new test whereby the injector's resistance is measured during normal gperation by feeding a fixed current through the injector and measuring the voltage across the injector. Injector coil failures are more accurately detected using this method than by simply measuring the injectors resistance with an ohmmeter. Refer to the instructions included with the tool for testing procedures.

This tool, and the injector coil test specifically, were developed to detect deterioration of injector coils due to the introduction of injector cleaners and fuel blends containing high levels of alcohol. Alcohol and water carried by the alcohol may attack and corrode injector coils resulting in a change in coil resistance and one or more of the following driveability symptoms:

^ rough idle

^ engine miss/surge

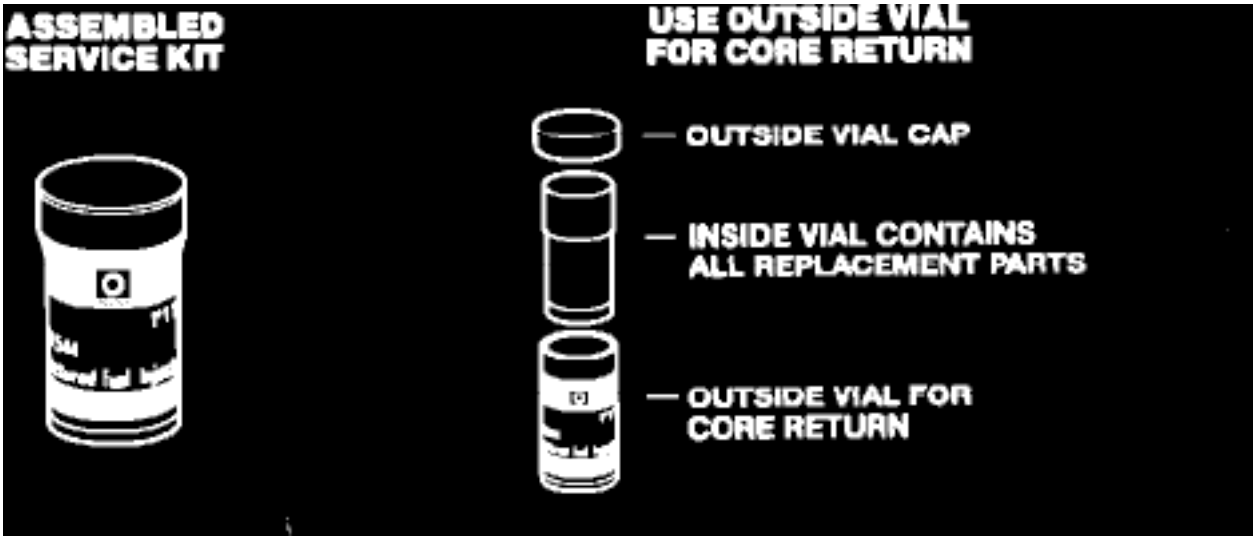
^ stall after start/hard start

^ fails emission test

^ poor fuel economy

^ exhaust odor

The injector coil test procedure also requires the use of the Digital Voltmeter, J-39200, to measure the voltage across the injector during the test. The Fuel Injector Tester, J-39021, supplies one of three fixed current values throughout the duration of the test. Selection of the supply current value (0.5, 2.5, or 4.0 amps) is based on the injector's specified resistance. When the push-to-start-test button is pressed, the tool energizes the injector coil for five seconds. The condition of the injector coil (pass/fail) is determined by the voltage reading displayed on the voltmeter while the injector is energized. Instructions and specifications for most GM fuel injectors are included with the tool.



Fuel Injector: Technical Service Bulletins Fuel Injectors - Remanufactured for TBI Systems

Number: 86-36

Section: 6C

Date: FEB., 1986

Subject: REMANUFACTURED FUEL INJECTORS FOR (TBI) THROTTLE BODY INJECTION

Model and Year: 1982-86 CHEVROLET VEHICLES WITH TBI TO:

ALL CHEVROLET DEALERS

Remanufactured Fuel Injectors for Chevrolet vehicles equipped with Throttle Body Injection (TBI) will be available from GMWDD on March 1, 1986. The new line of Remanufactured Injectors will cover all Chevrolet vehicles with single point and dual point TBI for model years 1980 - 1986. An application chart is attached.

WARRANTY

Remanufactured TBI Fuel Injectors are the recommended choice for new vehicle warranties requiring an injector replacement. These injectors meet the same specifications as the brand new injectors they replace. After March 1, 1986, Dealers should begin to order Remanufactured Injectors to be used for warranty, however, new injectors may still be used until inventory is depleted. Beyond vehicle warranty, the injectors are warranted for 90 days and/or 4,000 miles.

PACKAGING

PACKAGING

In order to help dealers return the core injectors in good condition, a two-tube package was designed. The inner tube contains the injector and all of the additional parts and instructions necessary to install the remanufactured injector. The outside tube MUST be used to return the old injector to obtain core credit.

APPLICATION

REMANUFACTURED CORRESPONDING

INJECTOR NEW INJECTOR APPLICATION

SERVICE KIT SERVICE KIT MODEL YEAR, ENGINE SOURCE, ENGINE SIZE

17111695 17079694 1983-86 Chevrolet 2.0

17111550 17111456 1986 Chevrolet 2.8

17111542 17111159 1985 Chevrolet 4.3

17111694 17111468 1986 Chevrolet 4.3

17111545 17078855 1982-83 Chevrolet 5.0

17111546 17078885 1982-83 Chevrolet 5.0

17111547 17078846 1982-84 Chevrolet 5.7

17111548 17078827 1982-84 Chevrolet 5.7

Fuel Pressure: Specifications

Fuel Pressure .... 27.5 to 44.8 kPa (4 to 6.5 psi) Fuel Pump Vacuum .... 50.6 kPa (15 inches Hg)

Fuel Pressure: Testing and Inspection Fuel Pump Flow Test - Fuel Injected

FUEL PUMP FLOW TEST

1. Disconnect the EFI fuel feed line, then connect suitable hose to line and direct end into suitable container.

2. Apply battery voltage to the fuel pump test terminal. The fuel pump should supply 1/2 pint or more fuel within 15 seconds.

3. If fuel flow is below minimum, check for fuel restrictions. If there is no restrictions, check pump vacuum and/or pressure.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Fuel Injected

FUEL PRESSURE TEST

- Turn engine "OFF" and perform Fuel Pressure Relief procedure.

CAUTION: A small amount of fuel may be released, after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Place the cloth in an approved container when disconnect is completed.

- Install fuel pressure gage J-29658A/BT8205, or equivalent, at the outlet side of the in-line fuel filter.

- Start engine and observe fuel pressure reading. It should be 62-90 kPa (9-13 psi).

- Relieve fuel pressure.

- Remove fuel pressure gage.

- Re-install fuel hose or pipe assembly to in-line fuel filter.

- Start engine and check for fuel leaks.

*** THIS PROCEDURE HAS BEEN UPDATED BY TSB # 90-6C-89, Dated 9/90

Some 1985-90 engines equipped with 2.5L, 2.8L, 4.3L, 5.0L, 5.7L or 7.4L may experience a condition where fuel delivery is interrupted to the engine causing a "no start condition". This condition may be caused by deterioration of the in-tank fuel pump coupler hose located between the fuel pump sending unit and the fuel pump. This condition may be repaired by replacing the original coupler hose with a new VITON coupler hose kit P/N 25028041. The kit consist of a new VITON hose and two clamps.

Fuel Pressure: Testing and Inspection Fuel Pump Pressure Test - Mechanical Fuel Pump

FUEL PUMP PRESSURE TEST

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be (4 to 6.5 psi). 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pressure: Testing and Inspection Fuel Pump Vacuum Test - Mechanical Fuel Pump

FUEL PUMP VACUUM TEST

1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least (15" Hg.). If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.

Fuel Pressure: Testing and Inspection Fuel System Pressure Test - Carbureted

Fuel Pump Flow Test:

1. Connect hose from carburetor fuel feed line to a suitable unbreakable container and crank engine. 2. Fuel pump should supply 1/2 pint or more in 15 seconds. 3. If flow is below minimum, check for fuel restriction. If there is no restriction, check pump pressure and/or vacuum.

Fuel Pump Pressure Test:

1. Disconnect the fuel line at the carburetor. 2. Install a low pressure gage onto the line. 3. Start the engine. 4. Fuel pump pressure should be 4 to 6.5 psi. 5. If pressure is less, check for restrictions in fuel tank sender filter, lines or hoses. 6. Reconnect the fuel line.

Fuel Pump Vacuum Test:

1. Disconnect inlet hose at fuel pump and connect a vacuum gauge. 2. Crank or run engine until maximum vacuum is reached. If the vacuum reading is less than (15" Hg.), replace the fuel pump. If more than

(15"Hg.), go to step 3.

3. Check fuel lines and hoses for splits, leaks or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine

until vacuum reaches it's peak. Vacuum should be at least 15" Hg. If less, repair or replace the malfunctioning line or hose.

4. If the fuel lines and pump check OK, remove tank unit, replace strainer and clean the tank.

Fuel Return Line: Technical Service Bulletins Fuel - Feed/Return Pipe Repair

Number: 89-31-6C

Section: 6C

Date: NOV., 1988

Subject: FUEL FEED AND/OR RETURN PIPE REPAIR

Model and Year: 1984-89 CHEVROLET PASSENGER AND LIGHT DUTY TRUCK VEHICLES

TO: ALL CHEVROLET DEALERS

When making any repairs to the fuel system, it is IMPORTANT that the following procedures be adhered to:

A minimum of 13.0 mm (1/2") clearance must be maintained around sharp edges such as flanges, pinch weld, etc., to prevent contact and chaffing. A minimum of 19 mm (3/4") clearance must be maintained around any moving parts.

^ When rubber hose is used to replace pipe, use only reinforced fuel-resistant hose which is identified with the word "Fluorelastomer" or "GM6163-M" on the hose. Hose inside diameter must match pipe outside diameter.

^ Do not use rubber hose within 100 mm (4") of any part of the exhaust system or within 254 mm (10") of the catalytic converter.

^ In the repairable areas, cut a piece of fuel hose 100 mm (4") longer than portion of the line removed.

If more than a 6 inch length of pipe is removed, use a combination of steel pipe and hose so that the total hose lengths, including the 100 mm (4") additional length will not be more than 254 mm (10") long. Follow the same routing as the original pipe.

^ Cut ends of pipe remaining on car square with a tube cutter. Using the first step of a double flaring tool, form a bead on the end of both pipe sections. If pipe is too corroded to withstand the beading operation without damage, the pipe should be replaced. If a new section of pipe is used, form a bead on both ends of it also.

^ Use screw-type hose clamp No. 2494772 or equivalent. Slide clamps onto pipe and push hose 51 mm (2") onto each portion of fuel pipe. Tighten clamps on each side of repair.

Fuel Supply Line: Technical Service Bulletins Fuel - Feed/Return Pipe Repair

Number: 89-31-6C

Section: 6C

Date: NOV., 1988

Subject: FUEL FEED AND/OR RETURN PIPE REPAIR

Model and Year: 1984-89 CHEVROLET PASSENGER AND LIGHT DUTY TRUCK VEHICLES

TO: ALL CHEVROLET DEALERS

When making any repairs to the fuel system, it is IMPORTANT that the following procedures be adhered to:

A minimum of 13.0 mm (1/2") clearance must be maintained around sharp edges such as flanges, pinch weld, etc., to prevent contact and chaffing. A minimum of 19 mm (3/4") clearance must be maintained around any moving parts.

^ When rubber hose is used to replace pipe, use only reinforced fuel-resistant hose which is identified with the word "Fluorelastomer" or "GM6163-M" on the hose. Hose inside diameter must match pipe outside diameter.

^ Do not use rubber hose within 100 mm (4") of any part of the exhaust system or within 254 mm (10") of the catalytic converter.

^ In the repairable areas, cut a piece of fuel hose 100 mm (4") longer than portion of the line removed.

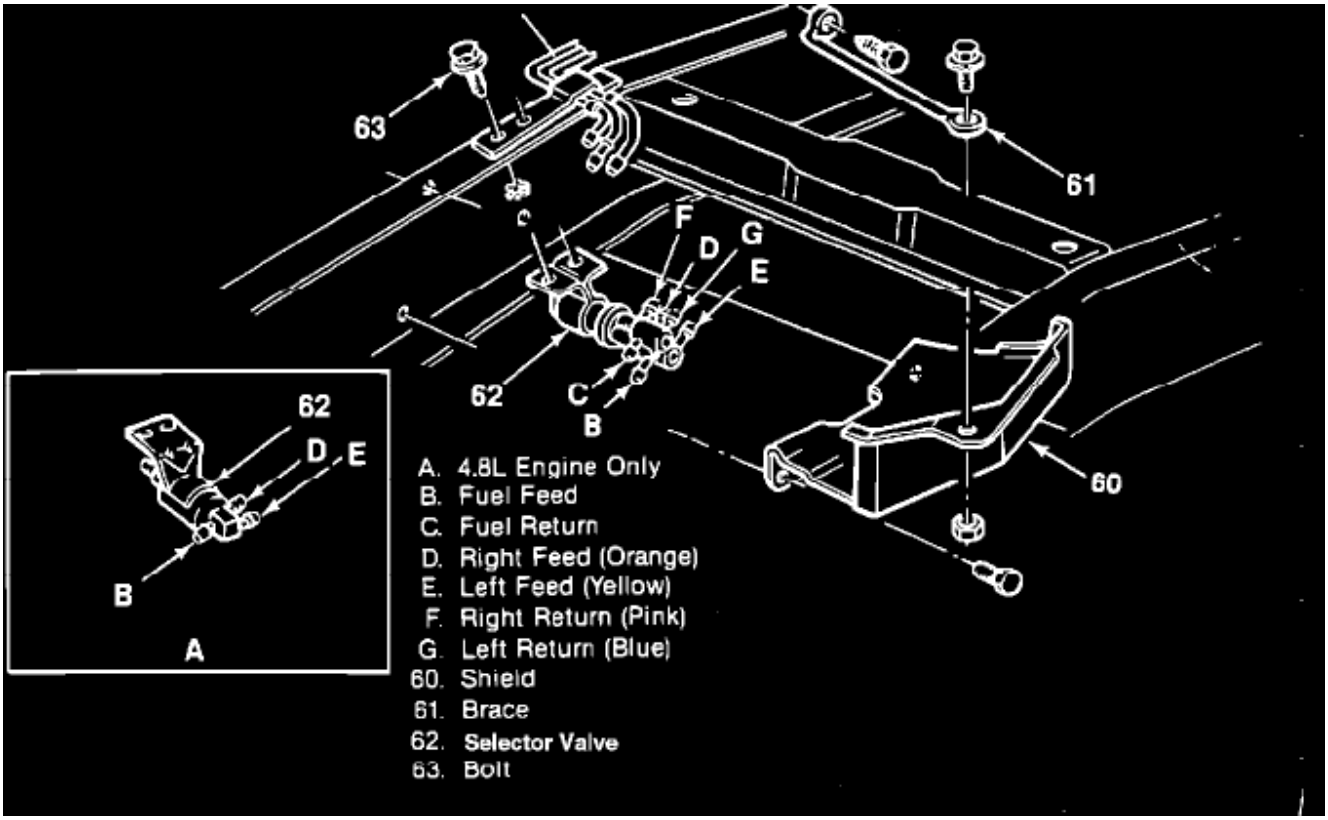
If more than a 6 inch length of pipe is removed, use a combination of steel pipe and hose so that the total hose lengths, including the 100 mm (4") additional length will not be more than 254 mm (10") long. Follow the same routing as the original pipe.

^ Cut ends of pipe remaining on car square with a tube cutter. Using the first step of a double flaring tool, form a bead on the end of both pipe sections. If pipe is too corroded to withstand the beading operation without damage, the pipe should be replaced. If a new section of pipe is used, form a bead on both ends of it also.

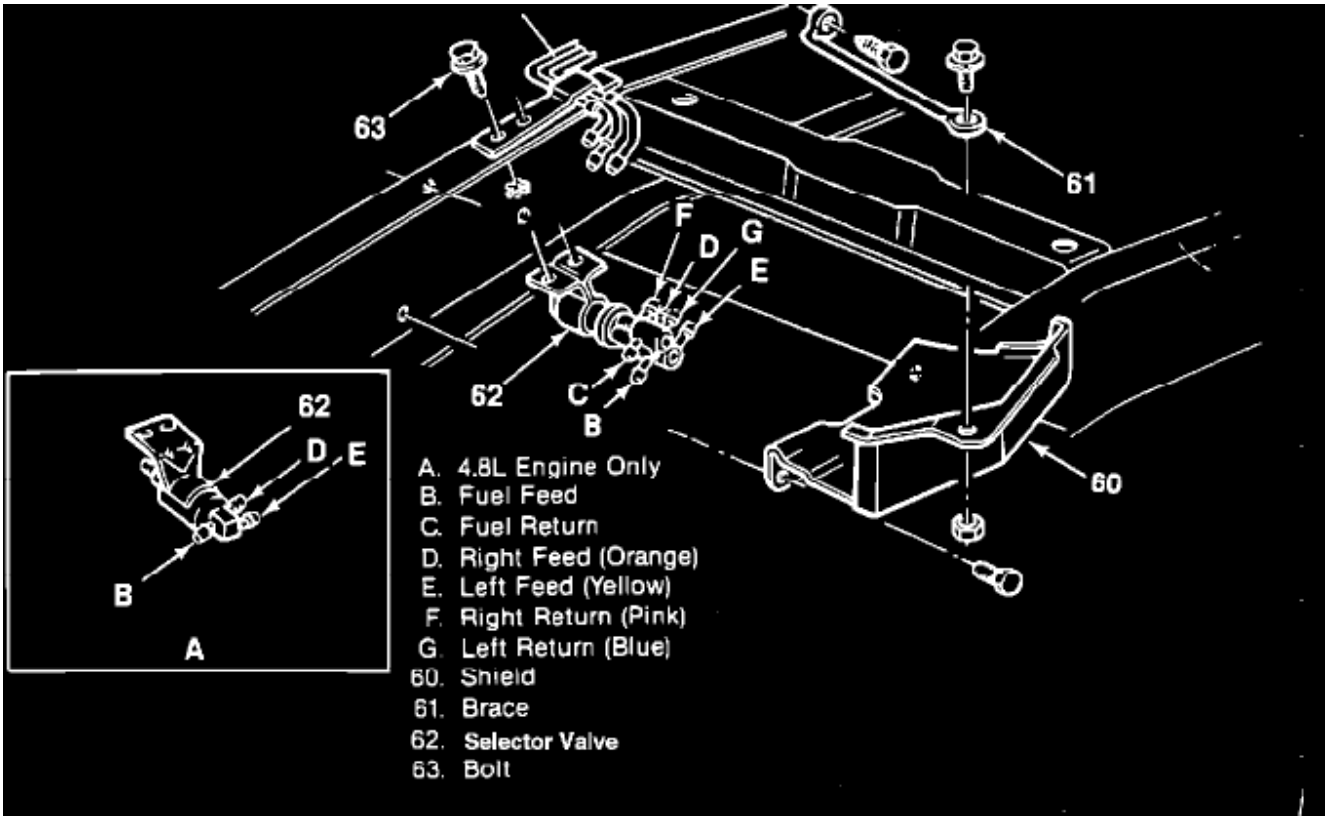
^ Use screw-type hose clamp No. 2494772 or equivalent. Slide clamps onto pipe and push hose 51 mm (2") onto each portion of fuel pipe. Tighten clamps on each side of repair.

Fuel Tank Pressure Release Valve: Testing and Inspection

Attach a short length of vacuum hose to valve inlet tube (fuel tank line connection) and blow into hose. The valve diaphragm should open and allow air to pass through valve. If not, replace valve assembly.



Auxiliary Fuel Selector Valve

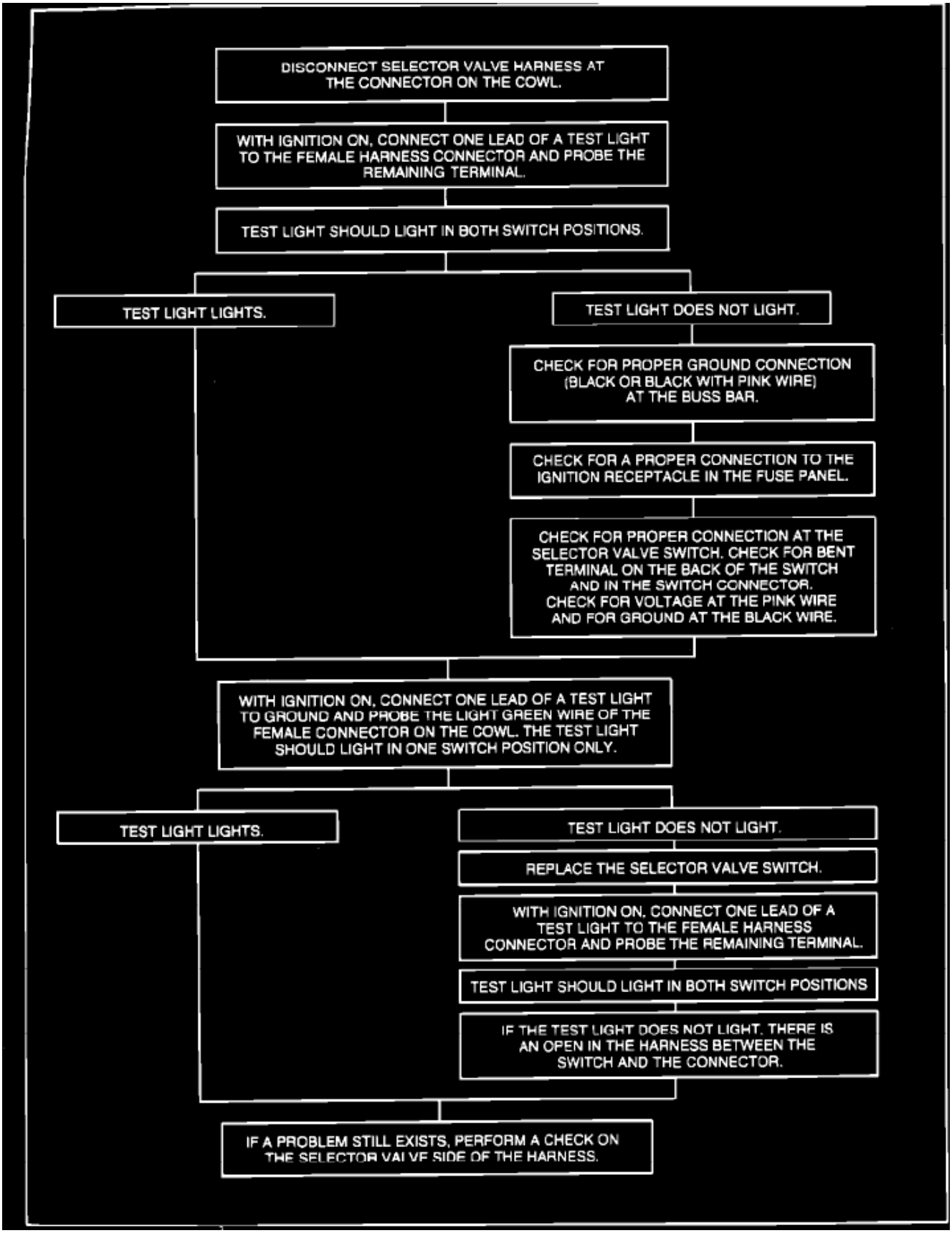


Auxiliary Fuel Tank Control: Description and Operation

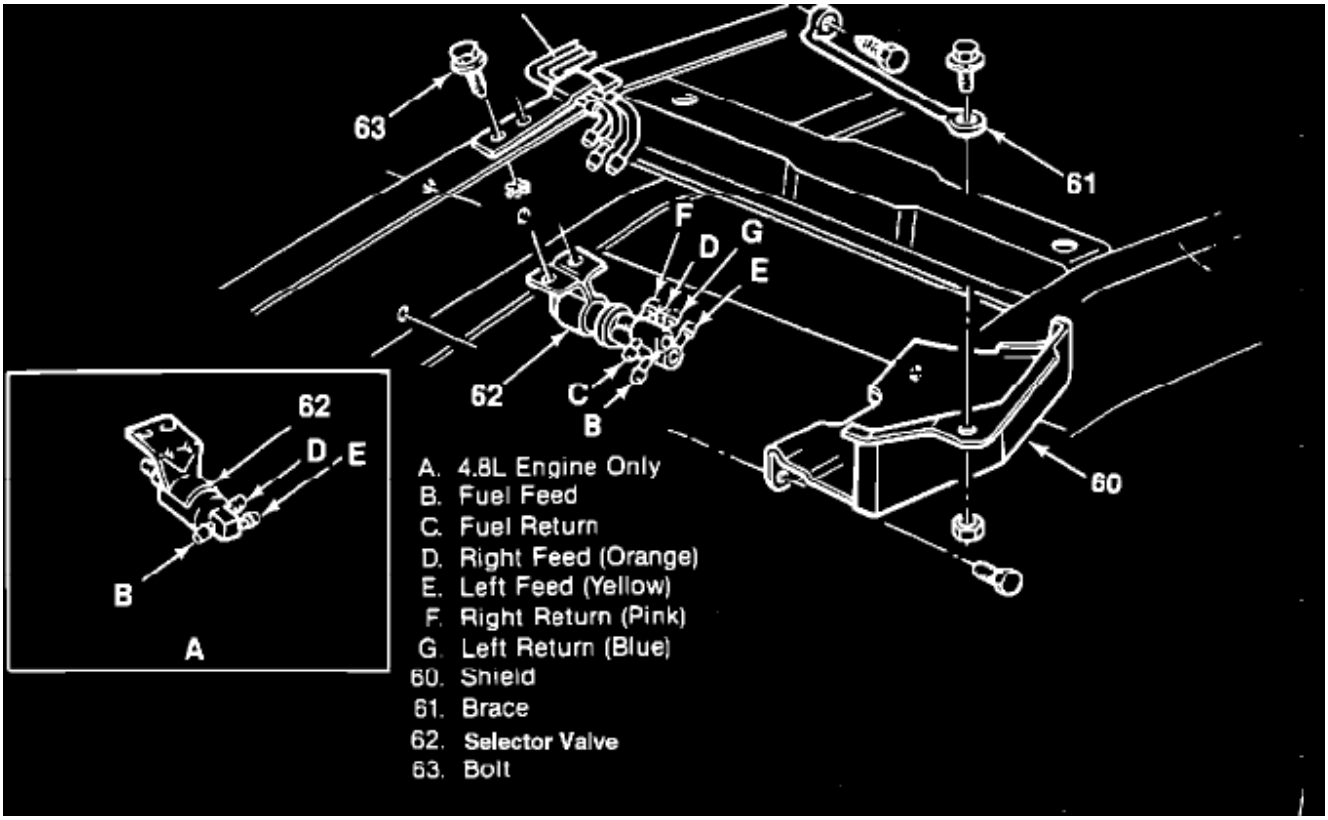
Auxiliary Fuel Selector Valve

NOTE: This information applies only to vehicles equipped with auxiliary fuel tank option.

An auxiliary fuel tank switching valve, controlled by an electrical switch, allows selection of either the primary fuel tank or auxiliary fuel tank.


DISCONNECT SELECTOR VALVE HARNESS AT THE CONNECTOR ON THE COWL.
WITH IGNITION ON, CONNECT ONE LEAD OF A TEST LIGHT TO THE FEMALE HARNESS CONNECTOR AND PROBE THE REMAINING TERMINAL.
TEST LIGHT SHOULD LIGHT IN BOTH SWITCH POSITIONS.
TEST LIGHT LIGHTS.
TEST LIGHT DOES NOT LIGHT.
CHECK FOR PROPER GROUND CONNECTION (BLACK OR BLACK WITH PINK WIRE) AT THE BUSS BAR.
CHECK FOR A PROPER CONNECTION TO THE IGNITION RECEPTACLE IN THE FUSE PANEL.
CHECK FOR PROPER CONNECTION AT THE SELECTOR VALVE SWITCH. CHECK FOR BENT TERMINAL ON THE BACK OF THE SWITCH AND IN THE SWITCH CONNECTOR. CHECK FOR VOLTAGE AT THE PINK WIRE AND FOR GROUND AT THE BLACK WIRE.
WITH IGNITION ON, CONNECT ONE LEAD OF A TEST LIGHT TO GROUND AND PROBE THE LIGHT GREEN WIRE OF THE FEMALE CONNECTOR ON THE COWL. THE TEST LIGHT SHOULD LIGHT IN ONE SWITCH POSITION ONLY.
TEST LIGHT LIGHTS.
TEST LIGHT DOES NOT LIGHT.
REPLACE THE SELECTOR VALVE SWITCH.
WITH IGNITION ON, CONNECT ONE LEAD OF A TEST LIGHT TO THE FEMALE HARNESS CONNECTOR AND PROBE THE REMAINING TERMINAL.
TEST LIGHT SHOULD LIGHT IN BOTH SWITCH POSITIONS
IF THE TEST LIGHT DOES NOT LIGHT, THERE IS AN OPEN IN THE HARNESS BETWEEN THE SWITCH AND THE CONNECTOR.
IF A PROBLEM STILL EXISTS, PERFORM A CHECK ON THE SELECTOR VALVE SIDE OF THE HARNESS.

Auxiliary Fuel Tank Selector Diagnostic Chart



Auxiliary Fuel Tank Control: Service and Repair

Auxiliary Fuel Selector Valve

WARNING: To reduce the risk of personal injury when disconnecting the fuel hoses and lines, cover the fuel hoses and lines with a shop cloth to collect the fuel, and then place the cloth into an approved container.

REMOVAL:

The auxiliary fuel tank control valve is located under the right hand side, center of vehicle, attached to the inner side of the frame.

1. Disconnect negative battery cable from vehicle battery. 2. Raise vehicle. 3. Remove hose shield, when required. 4. Remove electrical connector from valve and switch assembly. 5. Remove fuel feed and return hoses. Note position and color markings on hoses. 6. Remove selector valve and meter switch from frame.

INSTALLATION:

1. Install the selector valve and meter switch to the frame. 2. Connect the fuel feed and return hoses, taking care to install hoses in the correct positions. 3. Connect electrical connector to valve and switch assembly. 4. Install hose shield, when required. 5. Lower vehicle. 6. Reconnect negative battery cable to vehicle battery. 7. START vehicle and allow to run while checking for fuel leaks.

Idle Speed/Throttle Actuator - Mechanical: Technical Service Bulletins Throttle Kicker - Revised Checking Procedure

Number: 86-99

Section: 6C

Date: JUNE, 1986

Subject: THROTTLE LEVER ACTUATOR (THROTTLE KICKER) CHECKING PROCEDURE

Model and Year: 1985-86 C, K, G AND P MODELS WITH 4.3L, 5.0L, 5.7L ENGINES AND 1985 M VAN WITH 4.3L ENGINE

TO: ALL CHEVROLET DEALERS

A change has been made in the Throttle Lever Actuator (Throttle Kicker) Checking Procedure found in the 1985 and 1986 Light Duty Truck Service Manuals. The current checking procedure, found in sections 6E8-109 (1985) and 6E8-105 (1986), does not differentiate between the V6 and V8 engines. This may lead to unnecessary throttle kicker replacement on the V6 engine.

The throttle kicker used on certain Federal and California V6 engines is used to maintain a stable idle speed under varying engine load conditions. It operates on the manifold vacuum available at idle and does not have an internal plunger return spring, but instead relies on throttle return spring pressure to retract the plunger. The California HD V8 engines (Codes M and W) use a throttle kicker for decel emission control, and operates on higher decel manifold vacuum. The kicker designed for these applications uses an internal plunger return spring that causes the plunger to retract automatically when vacuum is released. These differences in design necessitate different checking procedures.

The current checking procedure in the 1985 and 1986 Light Duty Service Manual is correct for the California HD V8 engines. An additional procedure is required for the Federal and California V6 engines (listed below).

THROTTLE KICKER CHECKING PROCEDURE (V6 FEDERAL AND CALIFORNIA EMISSIONS - ENGINE VIN CODE N)

1. With engine off (not running), hold throttle half way open to allow throttle kicker plunger to fully extend for testing.

2. Use J-23738-A or BT-7517, hand operated vacuum pump to apply 20" Hg (68 kPa) vacuum to the throttle kicker.

^ Apply finger pressure to the plunger to see if it has extended fully. If not, replace throttle kicker.

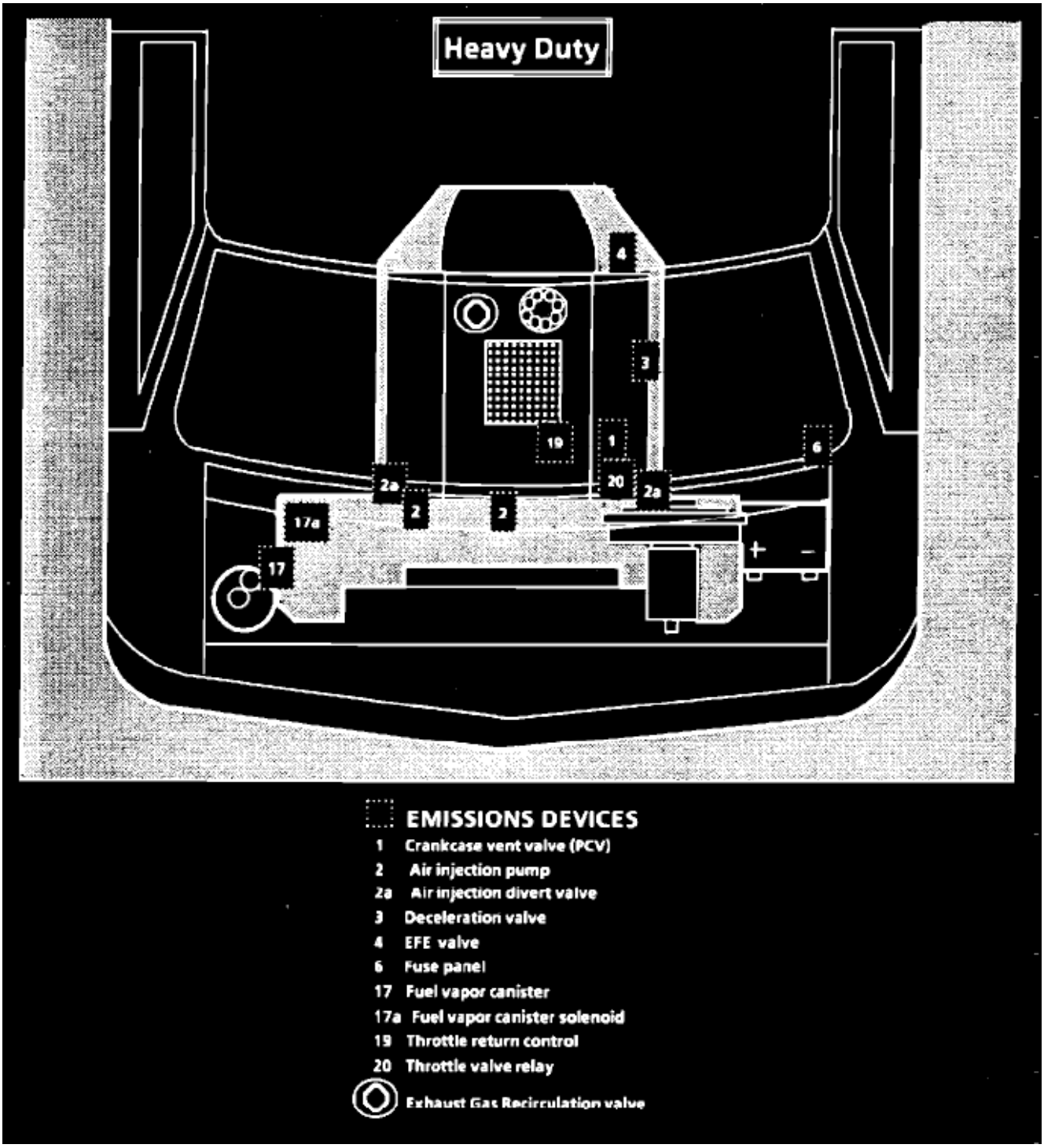
^ Observe vacuum gauge: Vacuum should hold for at least twenty seconds. If not, replace throttle kicker.

3. Release vacuum to the kicker.

^ Apply finger pressure to the plunger, to move it to its retracted position. If plunger will not retract, replace the kicker.

!!!! IMPORTANT !!!!

THE THROTTLE KICKER USED ON THE V6 ENGINE BY DESIGN DOES NOT HAVE AN INTERNAL PLUNGER RETURN SPRING. WHEN VACUUM IS RELEASED FROM KICKER, THE PLUNGER WILL NOT RETRACT ON ITS OWN. THIS UNIT REQUIRES THROTTLE LEVER PRESSURE TO RETRACT THE PLUNGER.

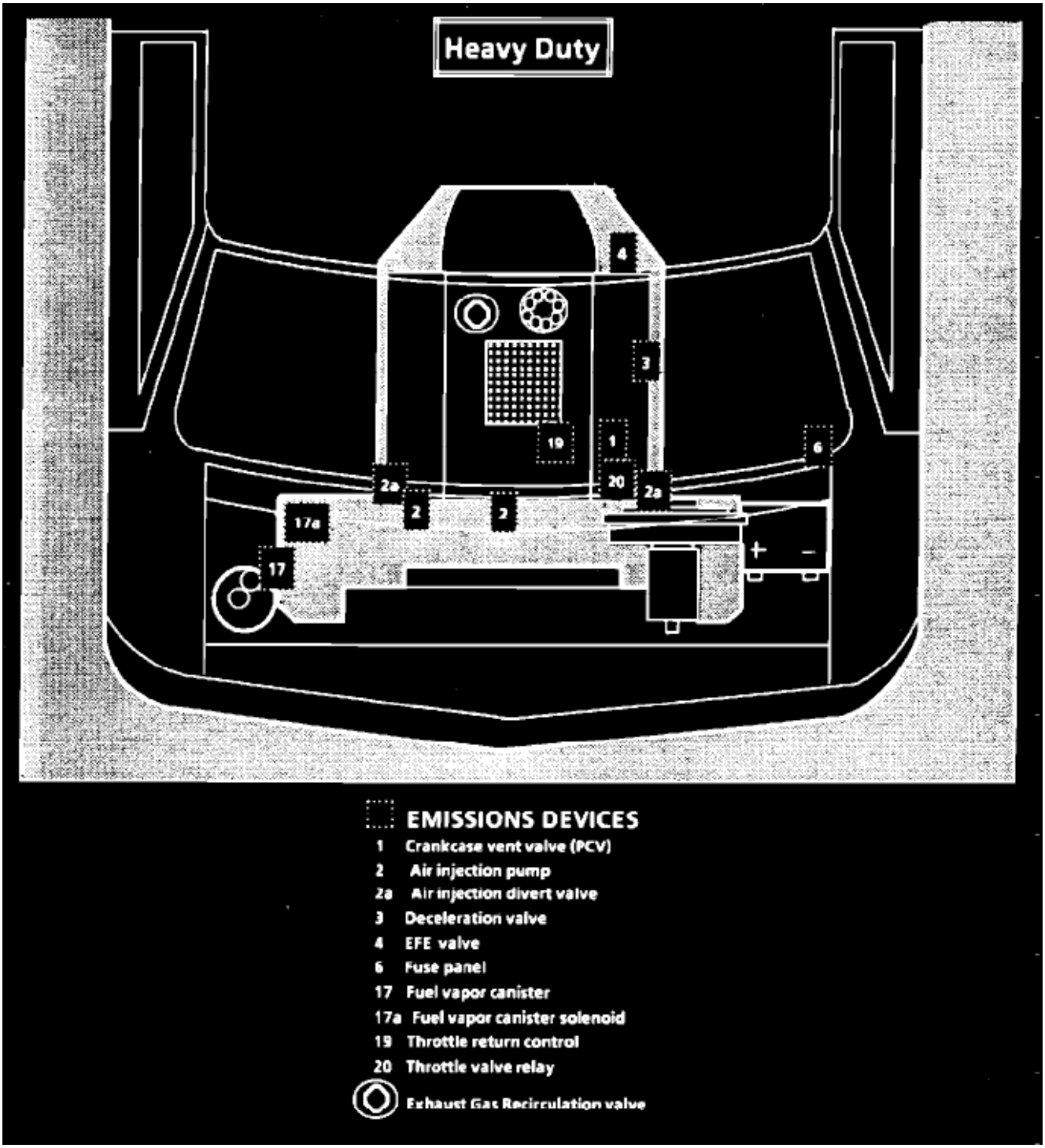


Idle Speed/Throttle Actuator - Mechanical: Locations

Underhood & Engine Components

LH Top Front Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions



Idle Up Control Relay: Locations

Underhood & Engine Components

LH Top Front Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

Engine	Year	Resistance (ohms)
All TBI	1981-90	20 min.

Idle Speed Control Motor: Electrical Specifications

IDLE SPEED CONTROL

Measured between terminals A& B and C & D.

Idle Speed Control Motor: Mechanical Specifications

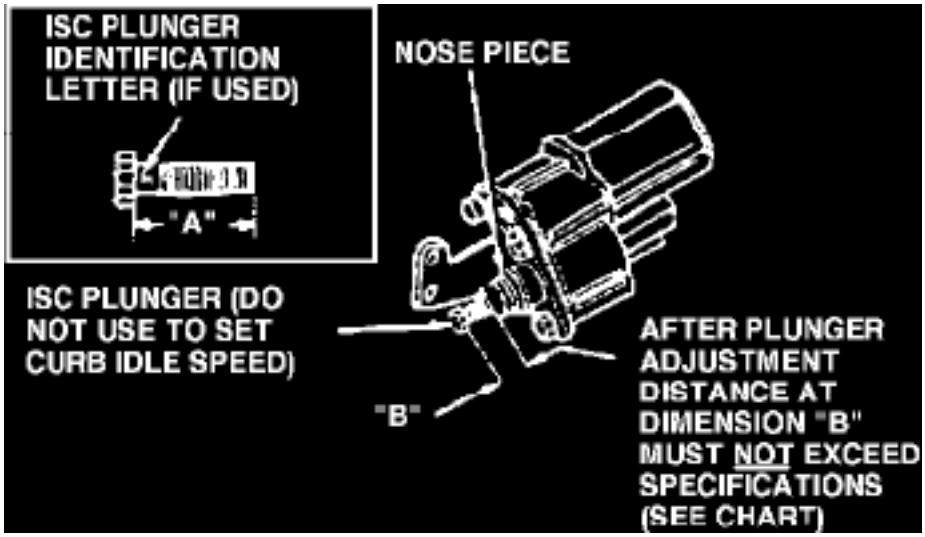
ISC PLUNGER ADJUSTMENT CHART

Identification Letter	Plunger Length Dimension "A"	Plunger Length Dimension "B"
None	14.1 mm (9/16")	5.6 mm (7/32")
None	16.3 mm (41/64")	8.0 mm (5/16")
X	18.5 mm (47/64")	10.0 mm (25/6'4")
A	19.3 mm (49/64")	10.8 mm (27/64")
Y	20.5 mm (51/64")	12.0 mm (15/32")
S	21.2 mm (27/32")	12.7 mm (1/2")
Z	22.5 mm (7/8")	14.0 mm (35/64")
G	23.2 mm (29/32")	14.7 mm (37/64")
E	25.6 mm (1LL)	17.1 mm (43/64")
L	27.5 mm (1 -3/32")	19.0 mm (3/4")
J	30.0 mm (1-3/16")	21.5 mm (27/32")
N	32.0 mm (1-17/64")	23.5 mm (59/64")
T	34.0 mm (1-11/32")	25.5 mm (1")

Idle Speed Control Motor: Description and Operation

The ISC assembly controls engine idle speed according to ECM programming.

When the throttle lever rests against the ISC plunger, the ISC acts as a dashpot on throttle closing per second.



Idle Speed Control Motor: Adjustments

On engines equipped with an idle speed control motor, idle speed is controlled by an electrical signal from the ECM. Do not use the ISC plunger to adjust curb idle. The motor varies idle speed from a base (minimum authority) to a high (maximum authority) idle speed. Do not adjust unless diagnosis indicates a malfunction. Check for proper base and high idle speed as follows. See Underhood Emission Label.

Plunger - Maximum Adjustment

NOTE: Prior to adjustment, check for an identification letter on the ISC plunger. If NO LETTER appears, using Tool J-29607, BT-8022 or equivalent,

remove plunger from ISC Unit. Then, measure length of plunger from back side of plunger head to end of plunger screw - Dimension "A". Record this measurement for use at Step 17. Reinstall plunger in ISC unit, turning plunger into a preset position so that the distance measured from the back side of the plunger head to the ISC nosepiece is LESS THAN Dimension "B".

ISC PLUNGER ADJUSTMENT CHART

Identification Plunger Length Plunger Length

Letter Dimension "A" Dimension "B"

None 14.1 mm (9/16") 5.6 mm (7/32")

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Z 22.5 mm (7/8") 14.0 mm (35/64")

G 23.2 mm (29/32") 14.7 mm (37/64")

E 25.6 mm (1LL) 17.1 mm (43/64")

L 27.5 mm (1 -3/32") 19.0 mm (3/4")

J 30.0 mm (1-3/16") 21.5 mm (27/32")

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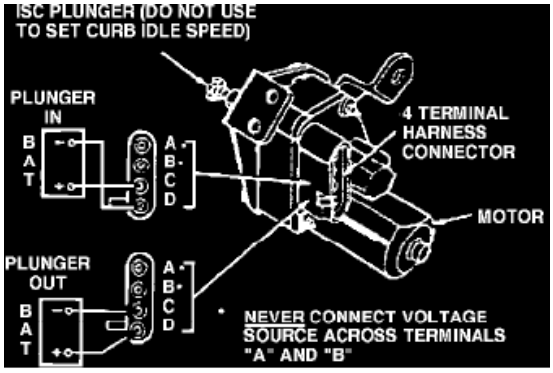
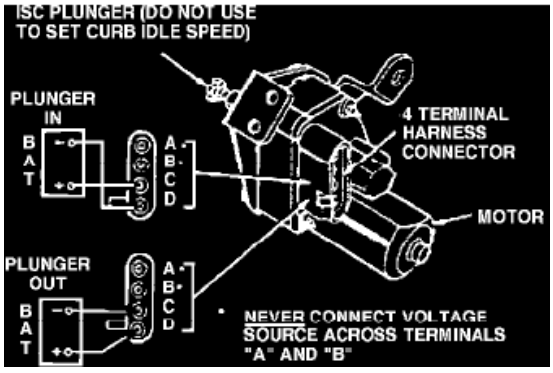

ISC PLUNGER (DO NOT USE TO SET CURB IDLE SPEED)
PLUNGER IN
BAT
A B C D
4 TERMINAL HARNESS CONNECTOR
MOTOR
PLUNGER OUT
BAT
A B C D
NEVER CONNECT VOLTAGE SOURCE ACROSS TERMINALS "A" AND "B"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Idle Speed Control Assembly - Typical

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures - see emission label for latest instructions.

2. Before starting engine, place transmission in PARK (AUTO trans.) or NEUTRAL (MANUAL transmission), set parking brake, and block drive wheels.

3. Connect dwell meter to mixture control (M/C) solenoid dwell lead. Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF".

5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary).

6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

7. Unplug connector from ISC motor.

8. Fully retract ISC plunger by applying 12 volts to terminal "C" and grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

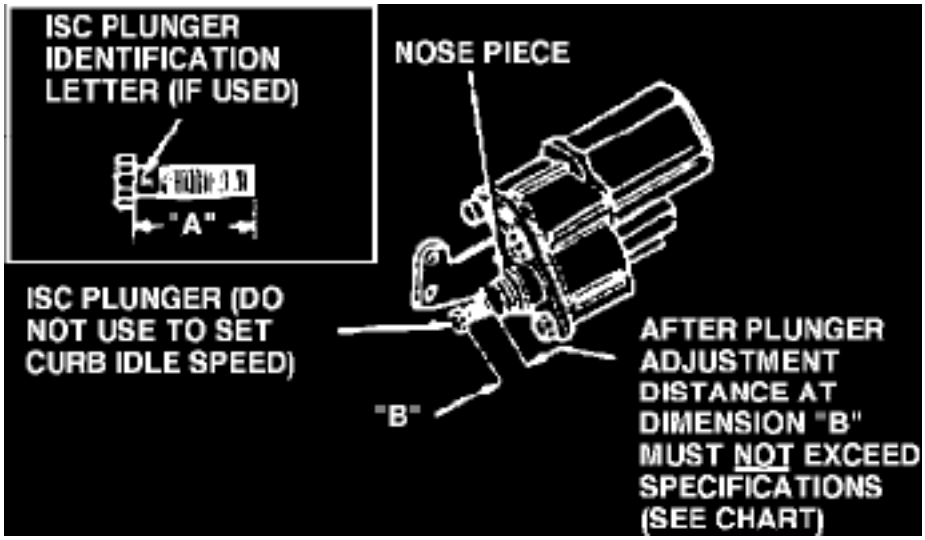
9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place A.T. transmission in Drive.

11. With ISC plunger fully retracted, adjust carburetor base (slow) idle stop screw (minimum authority) to the RPM shown in the carburetor charts.

12. PLACE TRANSMISSION IN PARK (AUTO TRANS.) OR NEUTRAL (MANUAL TRANS.).

Idle Speed Control Assembly - Typical



13. Fully extend ISC Plunger by applying 12 volts to terminal "D" and grounding lead to terminal "C" of the ISC Motor Connection. Leave power

applied only long enough to extend the plunger.

14. Manual transmission: Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown

in carburetor charts.

15. Automatic Transmission:

a. With transmission in PARK, using Tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

b. With parking brake set and drive wheels blocked, place transmission in drive. Using Tool J-29607 or BT-8022 or equivalent, turn ISC Plunger to obtain ISC adjustment RPM (Maximum Authority) shown in carburetor charts.

Plunger - Maximum Adjustment

16. Recheck ISC "Maximum Authority" RPM with voltage applied to Motor (Step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nose piece, Dimension "B". Dimension must NOT exceed

that shown by plunger type as either identified by plunger length or letter identification.

18. Fully retract ISC Plunger (Step 8). Place transmission in PARK (AUTO Trans.) or NEUTRAL (MANUAL Transmission) and turn ignition "Off".

Disconnect 12 Volt Power source, Ground lead, Tachometer and Dwell Meter. With ignition "Off" reconnect four Terminal Harness connectors to ISC Motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By restoring

the system to normal operation, the light will go out, but the trouble code will continue to be stored as an "INTERMITTENT" problem. In this case, it will be necessary to clear the diagnostic trouble codes by removing the ECM fuse from the fuse block for about 10 seconds.

Engine	Year	Resistance (ohms)
All TBI	1981-90	20 min.

Idle Speed Control Motor: Electrical Specifications

IDLE SPEED CONTROL

Measured between terminals A& B and C & D.

Idle Speed Control Motor: Mechanical Specifications

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Idle Speed Control Motor: Description and Operation

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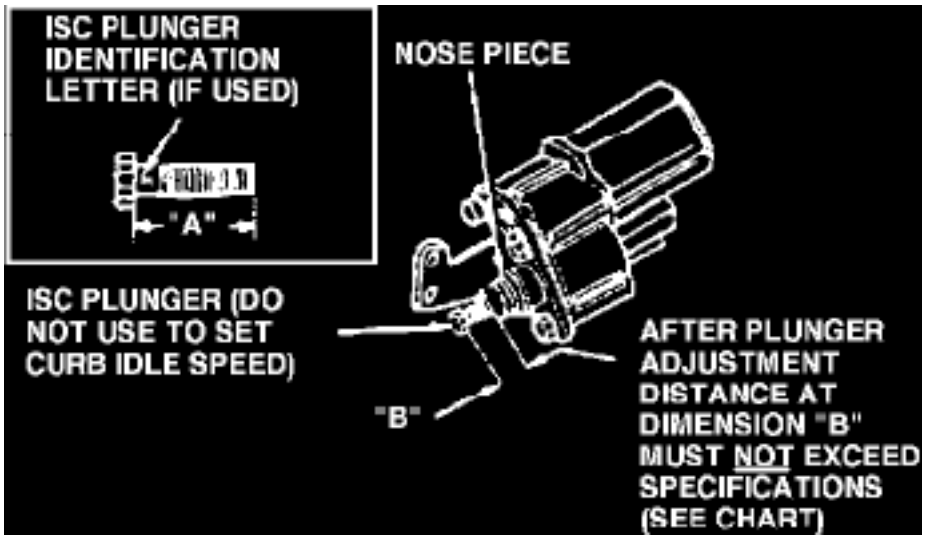

Idle Speed Control Motor: Adjustments

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Plunger - Maximum Adjustment

NOTE: Prior to adjustment, check for an identification letter on the ISC plunger. If NO LETTER appears, using Tool J-29607, BT-8022 or equivalent,

remove plunger from ISC Unit. Then, measure length of plunger from back side of plunger head to end of plunger screw - Dimension "A". Record this measurement for use at Step 17. Reinstall plunger in ISC unit, turning plunger into a preset position so that the distance measured from the back side of the plunger head to the ISC nosepiece is LESS THAN Dimension "B".

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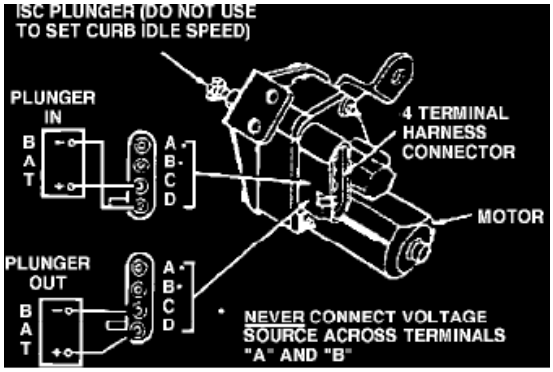
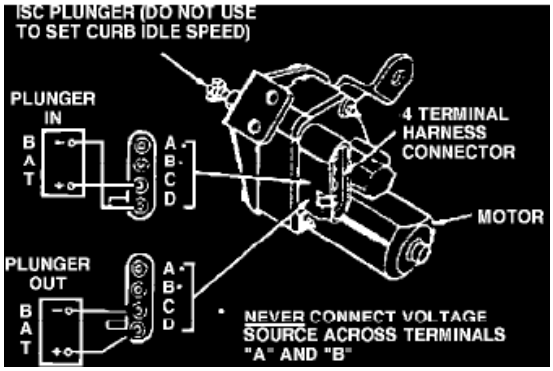




Idle Speed Control Assembly - Typical

CAUTION: DO NOT disconnect or connect ISC connector with ignition "ON" as damage to the ECM may occur.

1. Perform preliminary procedures - see emission label for latest instructions.

2. Before starting engine, place transmission in PARK (AUTO trans.) or NEUTRAL (MANUAL transmission), set parking brake, and block drive wheels.

3. Connect dwell meter to mixture control (M/C) solenoid dwell lead. Remember to set dwell meter on the six cylinder scale, regardless of the engine being tested.

4. Turn A/C "OFF".

5. Start engine and run until stabilized and in "closed loop" mode (dwell meter needle starts to vary).

6. Turn ignition "OFF".

CAUTION: Do not unplug ISC connector with ignition "ON" as damage to motor will occur.

7. Unplug connector from ISC motor.

8. Fully retract ISC plunger by applying 12 volts to terminal "C" and grounding lead to terminal "D" of the ISC motor connection.

CAUTION: DO NOT leave battery voltage applied to motor longer than necessary to retract ISC plunger. Prolonged contact will damage motor. Also, NEVER connect voltage source across terminal "A" and "B" as damage to the internal throttle contact switch will result.

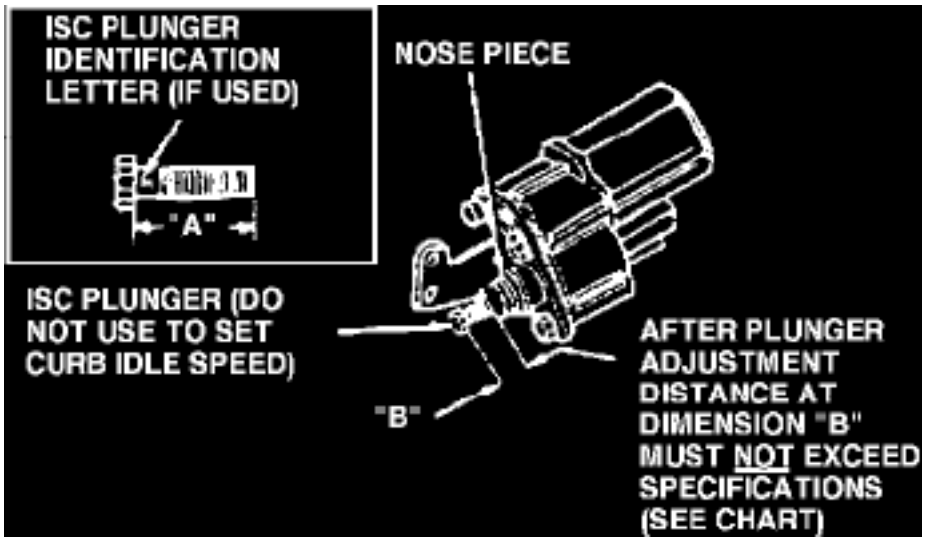
9. Start engine and run until dwell meter needle starts to vary, indicating "closed loop" operation.

10. Place A.T. transmission in Drive.

11. With ISC plunger fully retracted, adjust carburetor base (slow) idle stop screw (minimum authority) to the RPM shown in the carburetor charts.

12. PLACE TRANSMISSION IN PARK (AUTO TRANS.) OR NEUTRAL (MANUAL TRANS.).

Idle Speed Control Assembly - Typical



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in carburetor charts.

15. Automatic Transmission:

a. With transmission in PARK, using Tool J-29607, BT-8022 or equivalent, preset ISC plunger to obtain 1500 RPM.

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Plunger - Maximum Adjustment

16. Recheck ISC "Maximum Authority" RPM with voltage applied to Motor (Step 13). Motor will ratchet at full extension with power applied.

17. After adjustment of ISC plunger, measure distance from back side of plunger head to ISC nose piece, Dimension "B". Dimension must NOT exceed

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18. Fully retract ISC Plunger (Step 8). Place transmission in PARK (AUTO Trans.) or NEUTRAL (MANUAL Transmission) and turn ignition "Off".

Disconnect 12 Volt Power source, Ground lead, Tachometer and Dwell Meter. With ignition "Off" reconnect four Terminal Harness connectors to ISC Motor.

19. "TRICKING" the ISC motor as described will cause the "CHECK ENGINE" light to come on and an ISC motor trouble code to be set. By restoring

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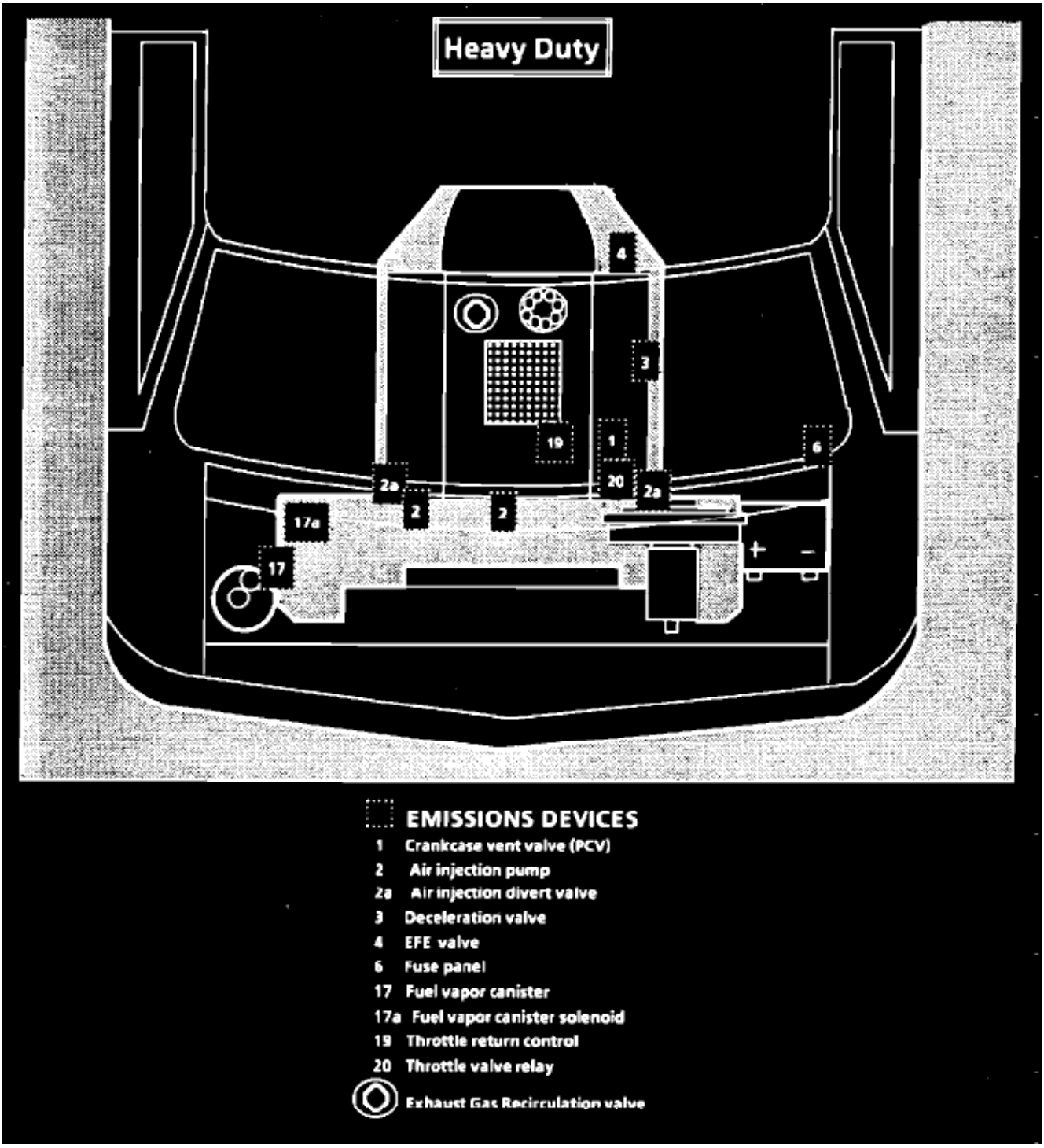


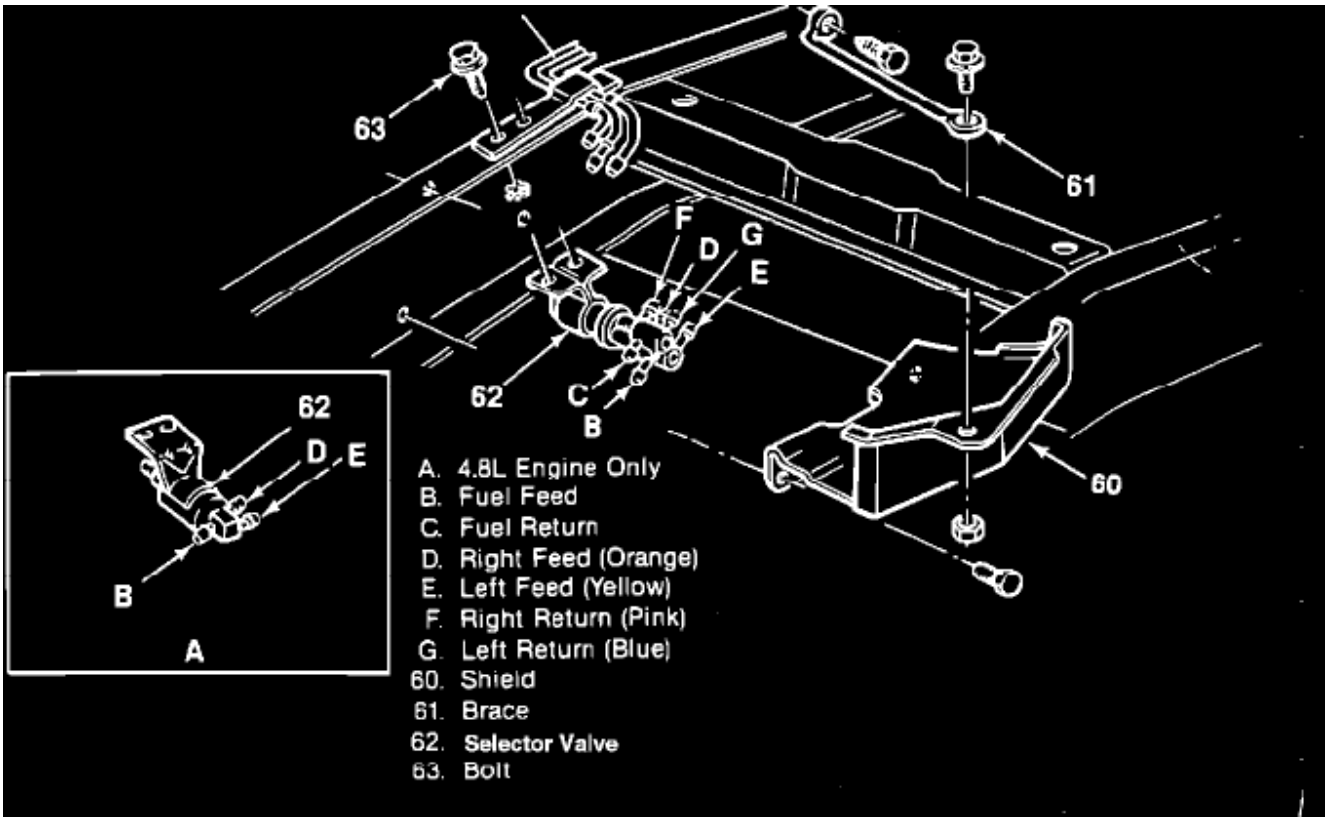
Idle Up Control Relay: Locations

Underhood & Engine Components

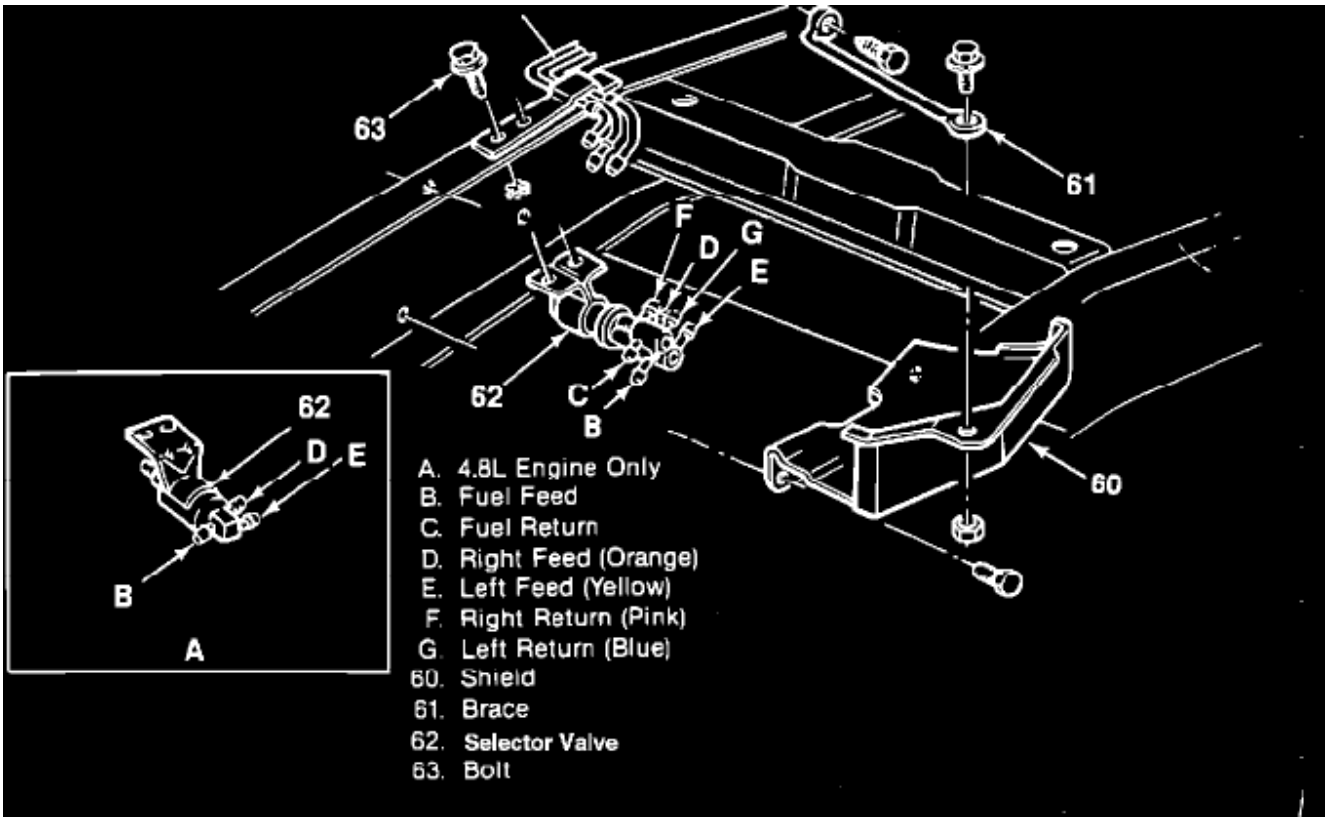
LH Top Front Of Engine

Applicable to: 1985 G Series w/5.7L Engine & Heavy Duty Emissions

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Fuel Delivery and Air Induction > Sensors and Switches - Fuel Delivery and Air Induction > Auxiliary Fuel Tank Control <--> [Fuel Tank Selector Switch] > Component Information > Locations



Auxiliary Fuel Selector Valve

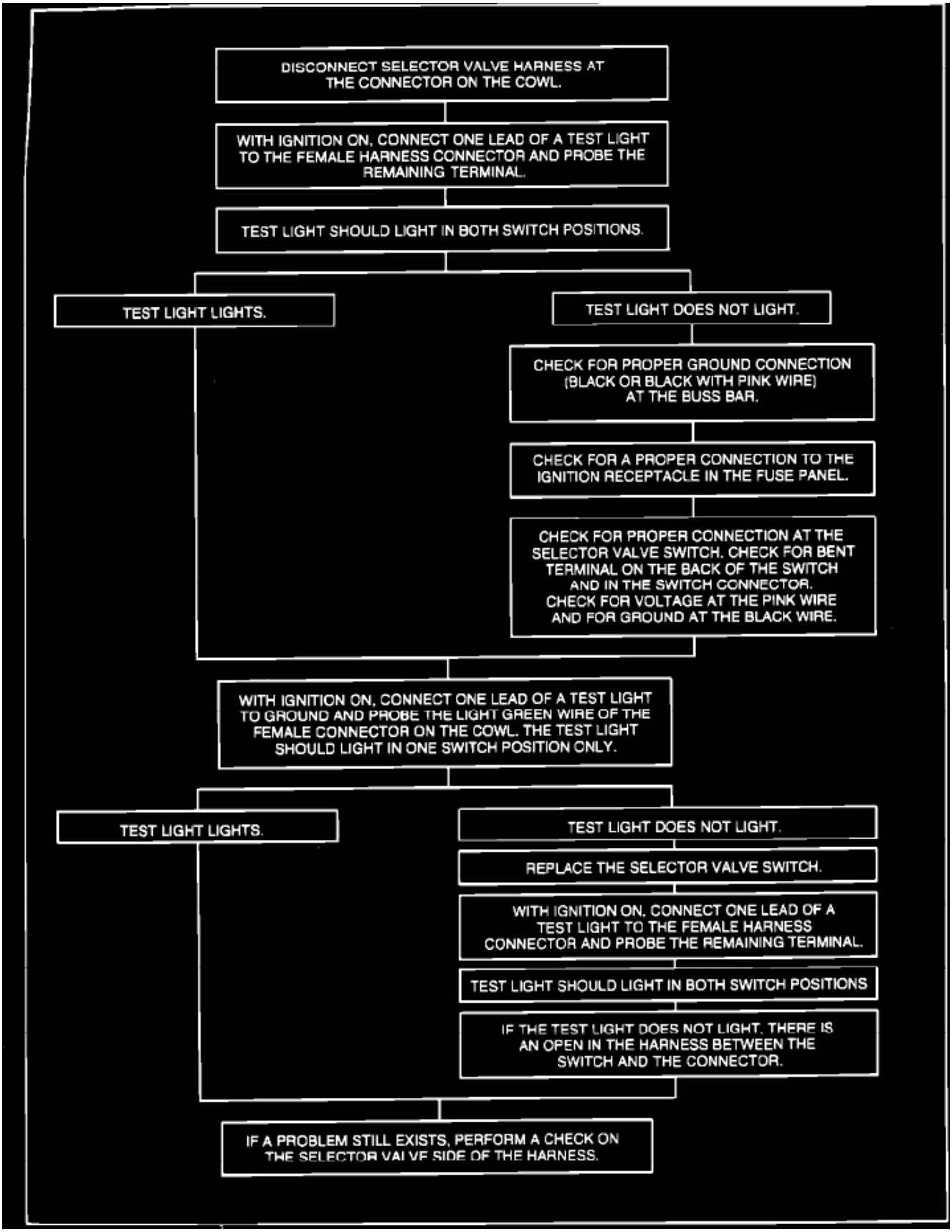


Auxiliary Fuel Tank Control: Description and Operation

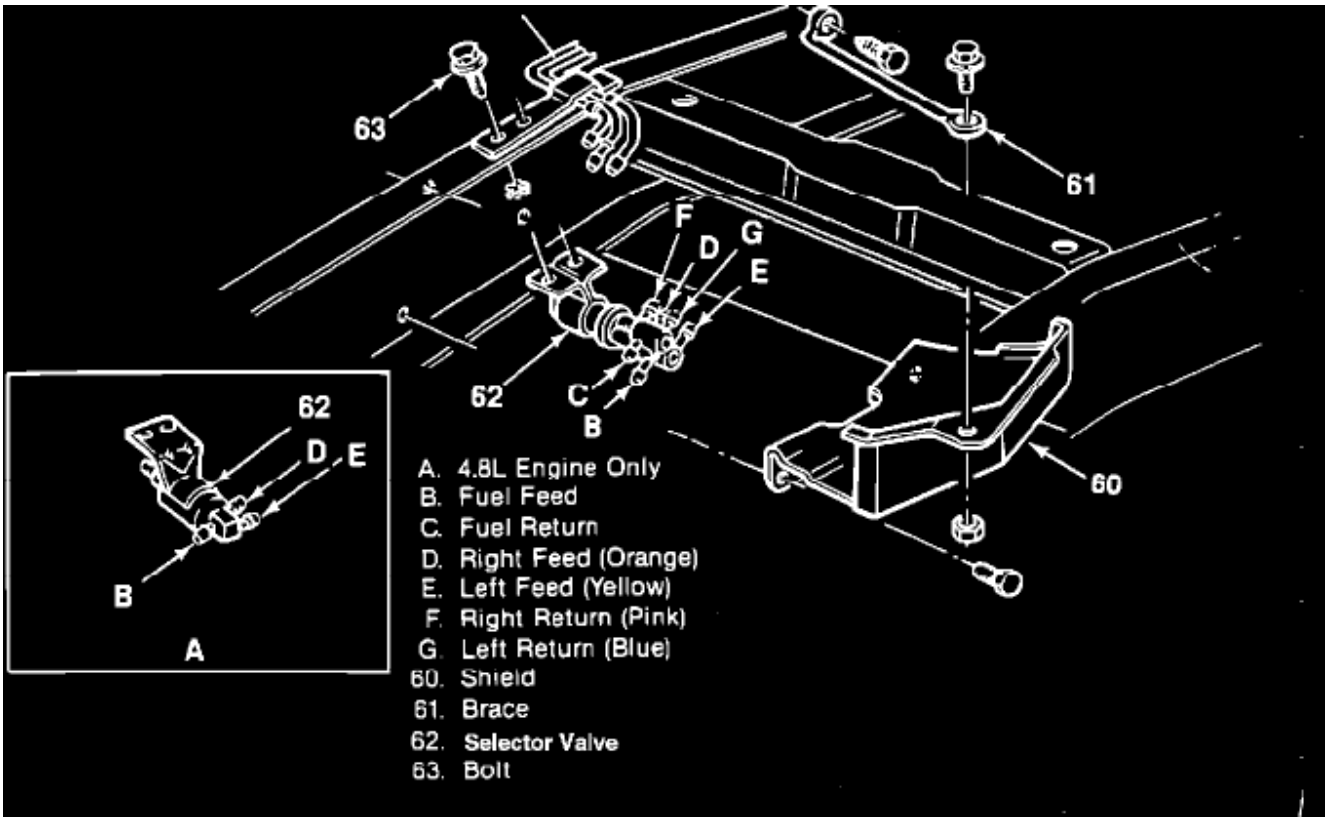
Auxiliary Fuel Selector Valve

NOTE: This information applies only to vehicles equipped with auxiliary fuel tank option.

An auxiliary fuel tank switching valve, controlled by an electrical switch, allows selection of either the primary fuel tank or auxiliary fuel tank.



Auxiliary Fuel Tank Selector Diagnostic Chart



Auxiliary Fuel Tank Control: Service and Repair

Auxiliary Fuel Selector Valve

WARNING: To reduce the risk of personal injury when disconnecting the fuel hoses and lines, cover the fuel hoses and lines with a shop cloth to collect the fuel, and then place the cloth into an approved container.

REMOVAL:

The auxiliary fuel tank control valve is located under the right hand side, center of vehicle, attached to the inner side of the frame.

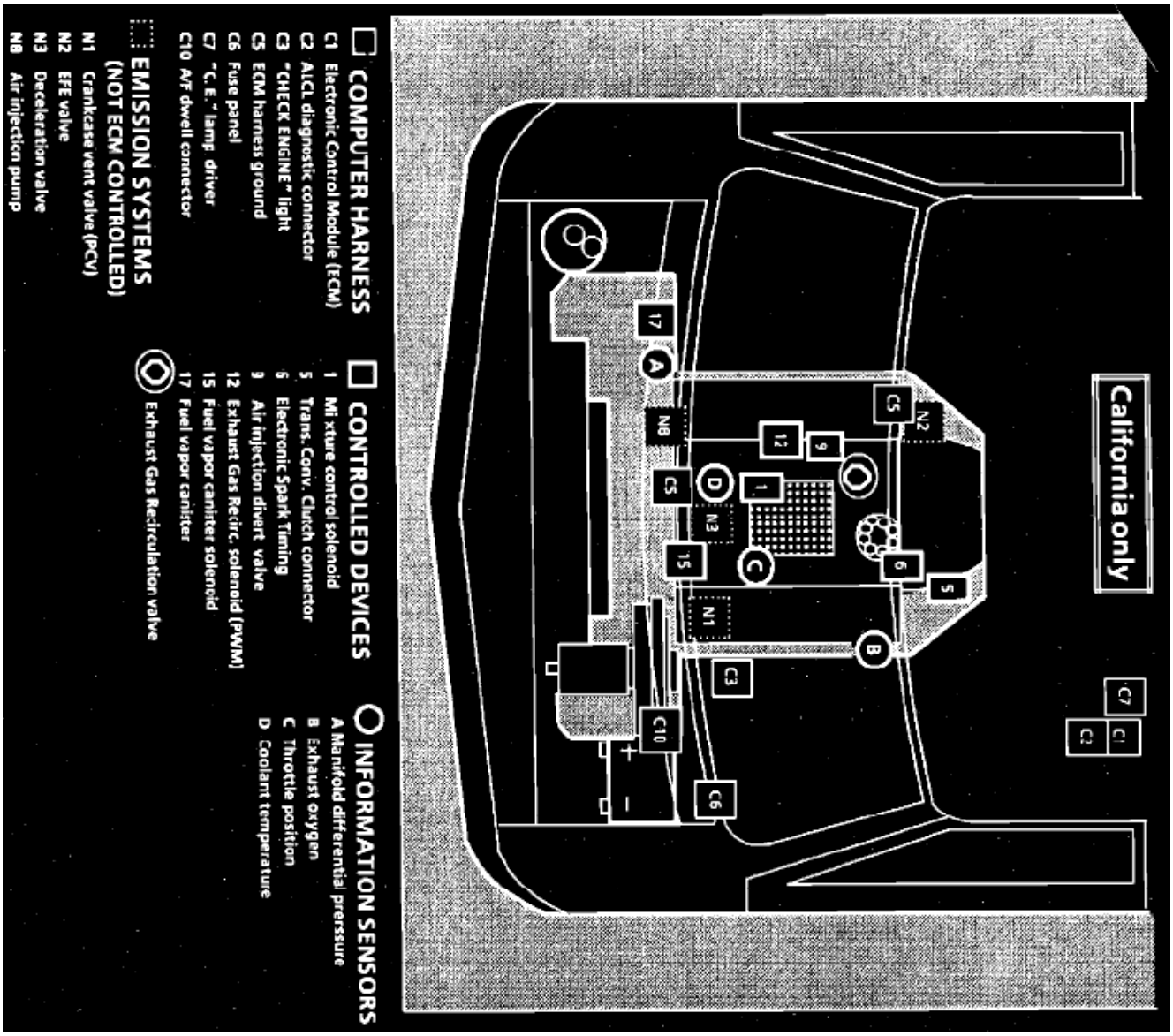
1. Disconnect negative battery cable from vehicle battery. 2. Raise vehicle. 3. Remove hose shield, when required. 4. Remove electrical connector from valve and switch assembly. 5. Remove fuel feed and return hoses. Note position and color markings on hoses. 6. Remove selector valve and meter switch from frame.

INSTALLATION:

1. Install the selector valve and meter switch to the frame. 2. Connect the fuel feed and return hoses, taking care to install hoses in the correct positions. 3. Connect electrical connector to valve and switch assembly. 4. Install hose shield, when required. 5. Lower vehicle. 6. Reconnect negative battery cable to vehicle battery. 7. START vehicle and allow to run while checking for fuel leaks.

Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Fig. 16 Throttle Position Sensor Specifications

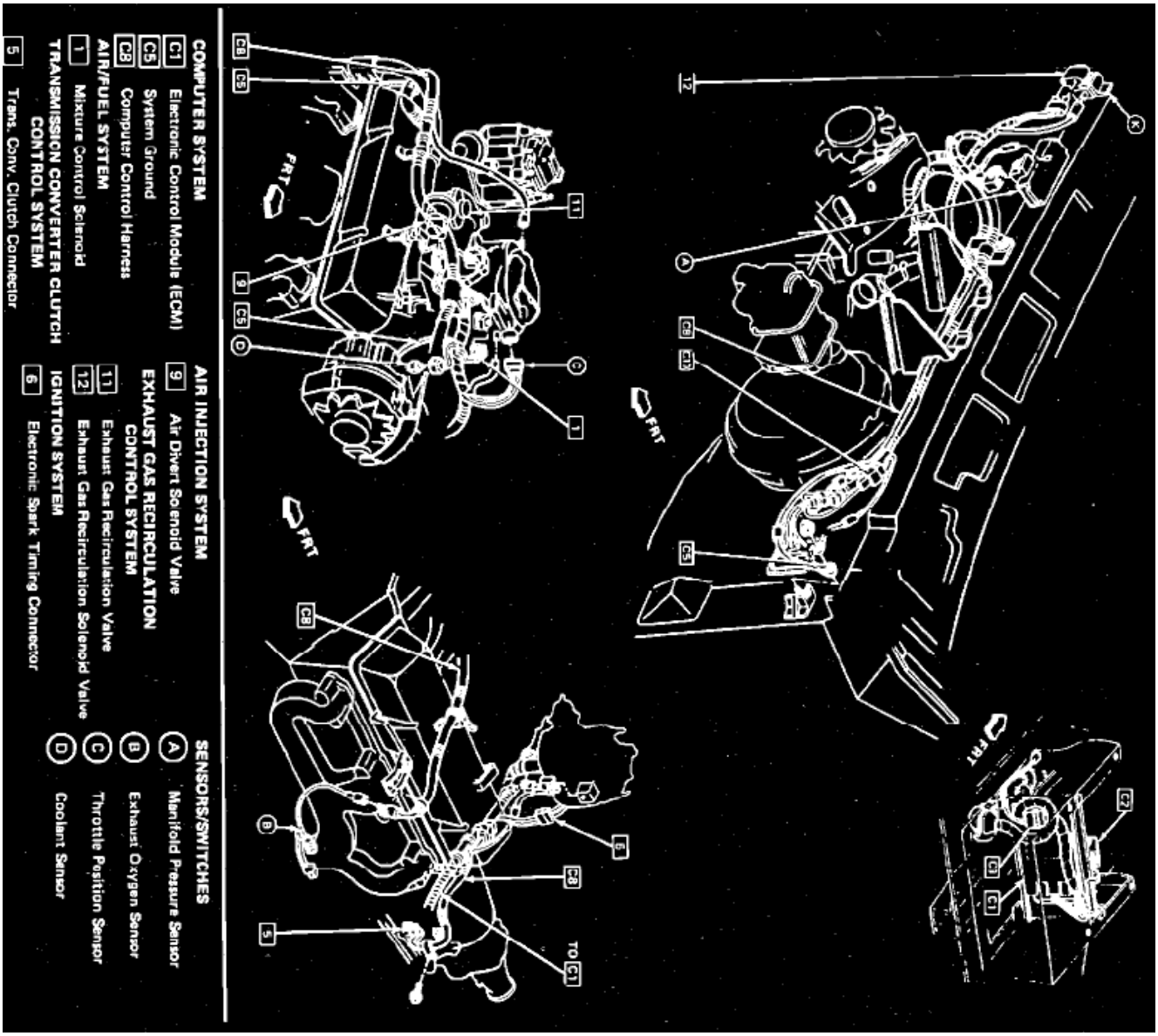


Throttle Position Sensor: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Throttle Position Sensor: Locations Except California

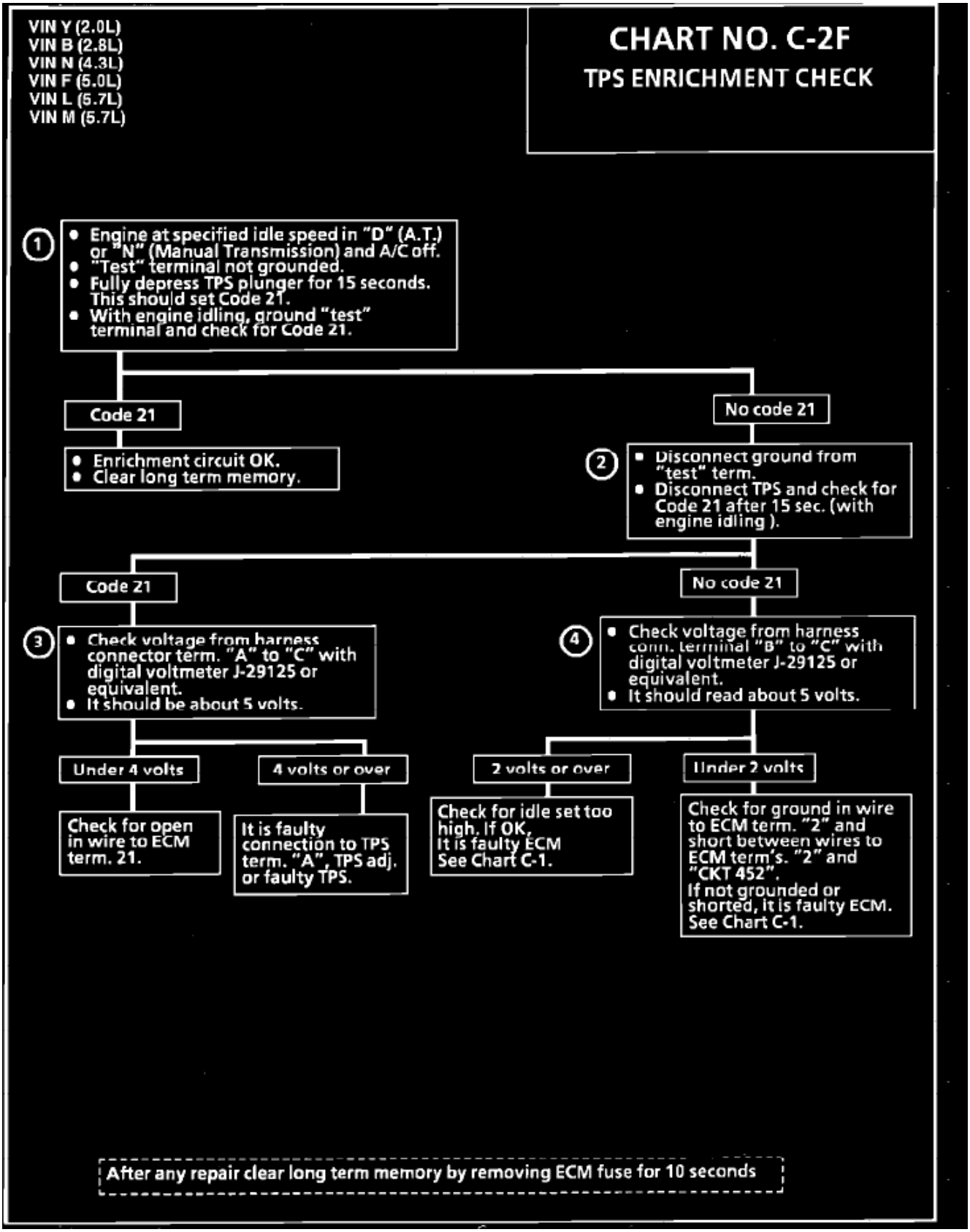
Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

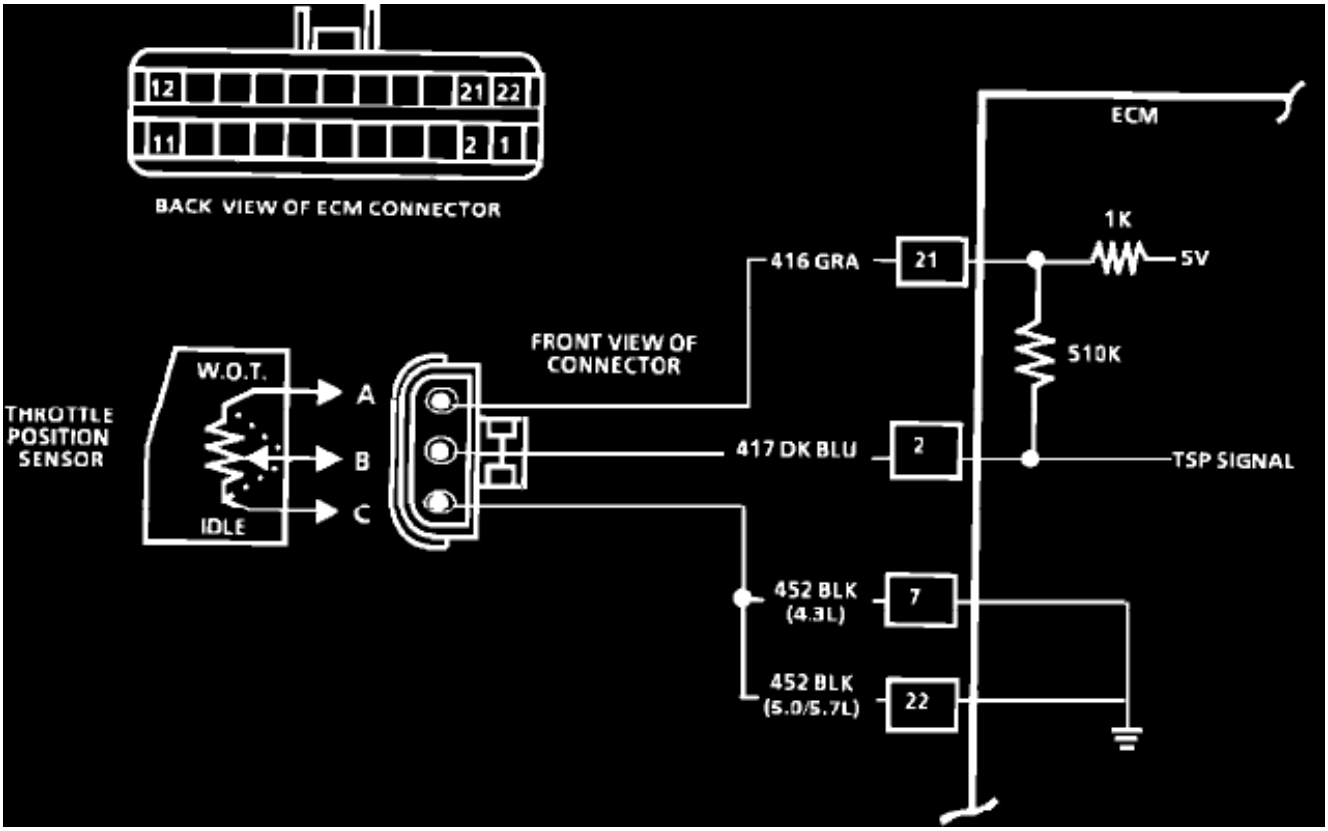
Throttle Position Sensor: Description and Operation

The TPS is mounted in the carburetor body and is moved by the accelerator pump linkage. When the throttle blades are closed, the TPS provides a low voltage (under 1 volt). This voltage signal will increase to up to 5 volts as the throttle blades are opened to wide open throttle. These voltage signals provide an indication of throttle position to the ECM.


VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART NO. C-2F
TPS ENRICHMENT CHECK
1
Engine at specified idle speed in "D" (A.T.) or "N" (Manual Transmission) and A/C off.
"Test" terminal not grounded.
Fully depress TPS plunger for 15 seconds. This should set Code 21.
With engine idling, ground "test" terminal and check for Code 21.
Code 21
Enrichment circuit OK.
Clear long term memory.
No code 21
2
Disconnect ground from "test" term.
Disconnect TPS and check for Code 21 after 15 sec. (with engine idling).
Code 21
3
Check voltage from harness connector term. "A" to "C" with digital voltmeter J-29125 or equivalent.
It should be about 5 volts.
Under 4 volts
Check for open in wire to ECM term. 21.
4 volts or over
It is faulty connection to TPS term. "A", TPS adj. or faulty TPS.
No code 21
4
Check voltage from harness conn. terminal "B" to "C" with digital voltmeter J-29125 or equivalent.
It should read about 5 volts.
2 volts or over
Check for idle set too high. If OK, It is faulty ECM See Chart C-1.
Under 2 volts
Check for ground in wire to ECM term. "2" and short between wires to ECM term's. "2" and "CKT 452". If not grounded or shorted, it is faulty ECM. See Chart C-1.
After any repair clear long term memory by removing ECM fuse for 10 seconds

Throttle Position Sensor: Testing and Inspection

Chart C-2F - TPS Enrichment Check



Wiring Diagram for Chart C-2F - TPS Enrichment Check

CHART C-2F - TPS ENRICHMENT CHECK

Test Description:

1. This step checks that the TPS will cause an ECM "Rich" command when fully depressed manually. On some vehicles, this will cause a low dwell (full rich). On others it will not.

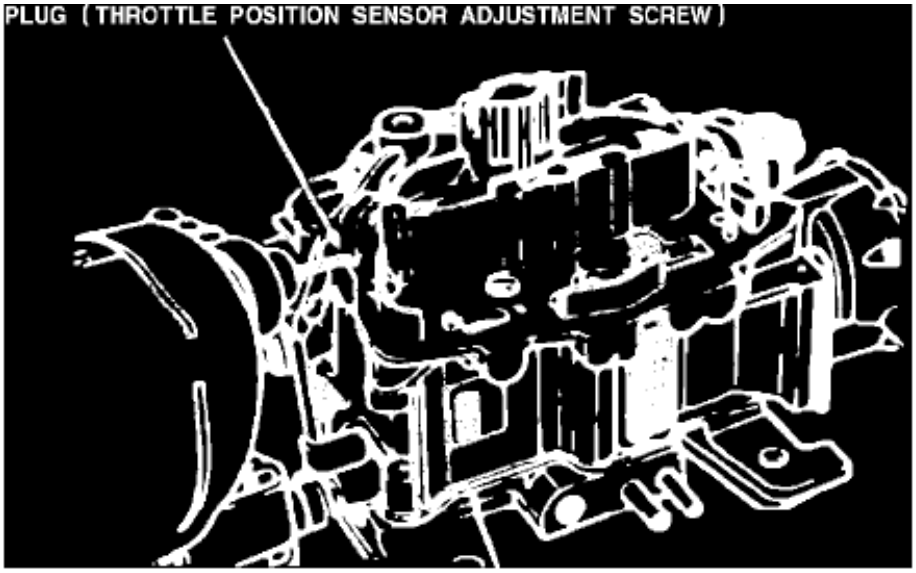
Code 21 should normally be set.

2. This step distinguishes between a faulty TPS or ECM harness/ECM.

Code 21 should normally be set, if engine RPM is not set above specifications.

3. This step checks for 5V. ref. at TPS. It should be about 5 volts. If loss of V. Ref were in the ECM, it should set Codes 21, 32 and 34 since this is the same 5V to VAC Sensor. Therefore, it must be an open in the wire.

4. This step checks for a grounded circuit. Normal circuit should read about 5 volts. Checking for grounded TPS output to Terminal "2" of ECM, or short in CKT 417 and 452 from TPS, indicates whether fault is in wiring or ECM. A voltmeter with a 10 megohms resistance must be used for an accurate reading.



Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.20	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Throttle Position Sensor: Adjustments

Fig. 15 Throttle Position Sensor Adjustment Screw Cover Removal

Fig. 16 Throttle Position Sensor Specifications

Do not remove plug sealing TPS adjustment or adjust TPS unless carburetor is overhauled or ``Computer Command Control (C3)'' system

diagnosis indicates a problem with the switch.

1. Drill a .078 (5/64) inch hole, 1/16-1/8 inch deep, in plug covering TPS adjustment, Fig. 15.

2. Thread a No. 8 sheet metal screw into hole and pry out plug using a suitable lever.

3. Remove TPS adjusting screw using tool J-28696 or equivalent.

4. Leaving electrical connector in place, connect a digital voltmeter between TPS center terminal (B) and bottom terminal (C), using jumper wires if necessary. Only a digital voltmeter with 10 megohm input impedance or higher can be used. Conventional voltmeters do not have sufficient resistance to obtain accurate readings.

5. With ignition on, engine stopped and A/C off, install TPS screw and adjust quickly to obtain specified TPS idle voltage, Fig. 16.

6. Turn ignition off and install new plug over TPS adjusting screw or seal opening with RTV sealer.

Throttle Position Sensor: Service and Repair

To replace Throttle Position Sensor it is necessary to remove the air horn assembly from the carburetor.

1. Remove or disconnect electrical connectors from M/C solenoid and TPS assembly.

2. Air horn removal:

a. Remove upper choke lever from end of choke shaft by removing attaching screw. Rotate upper choke lever to remove lever from choke link.

b. Remove choke link from lower lever inside the float bowl casting. Remove link by holding lower lever outward with small screwdriver and twisting link counter-clockwise.

c. Remove the retainer from the pump link, and remove link from lever. DO NOT remove pump lever from air horn.

d. Remove vacuum break hose from tube on float bowl.

e. Remove air horn-to-bowl screws; then remove the two countersunk attaching screws located next to the venturi.

f. Remove air horn from bowl by lifting it straight up. (Gasket should remain on float bowl).

3. Remove solenoid-metering rod plunger by lifting straight up.

4. Remove air horn gasket by lifting it from the bowl locating pins on the float bowl. DISREGARD GASKET.

5. Remove float bowl insert.

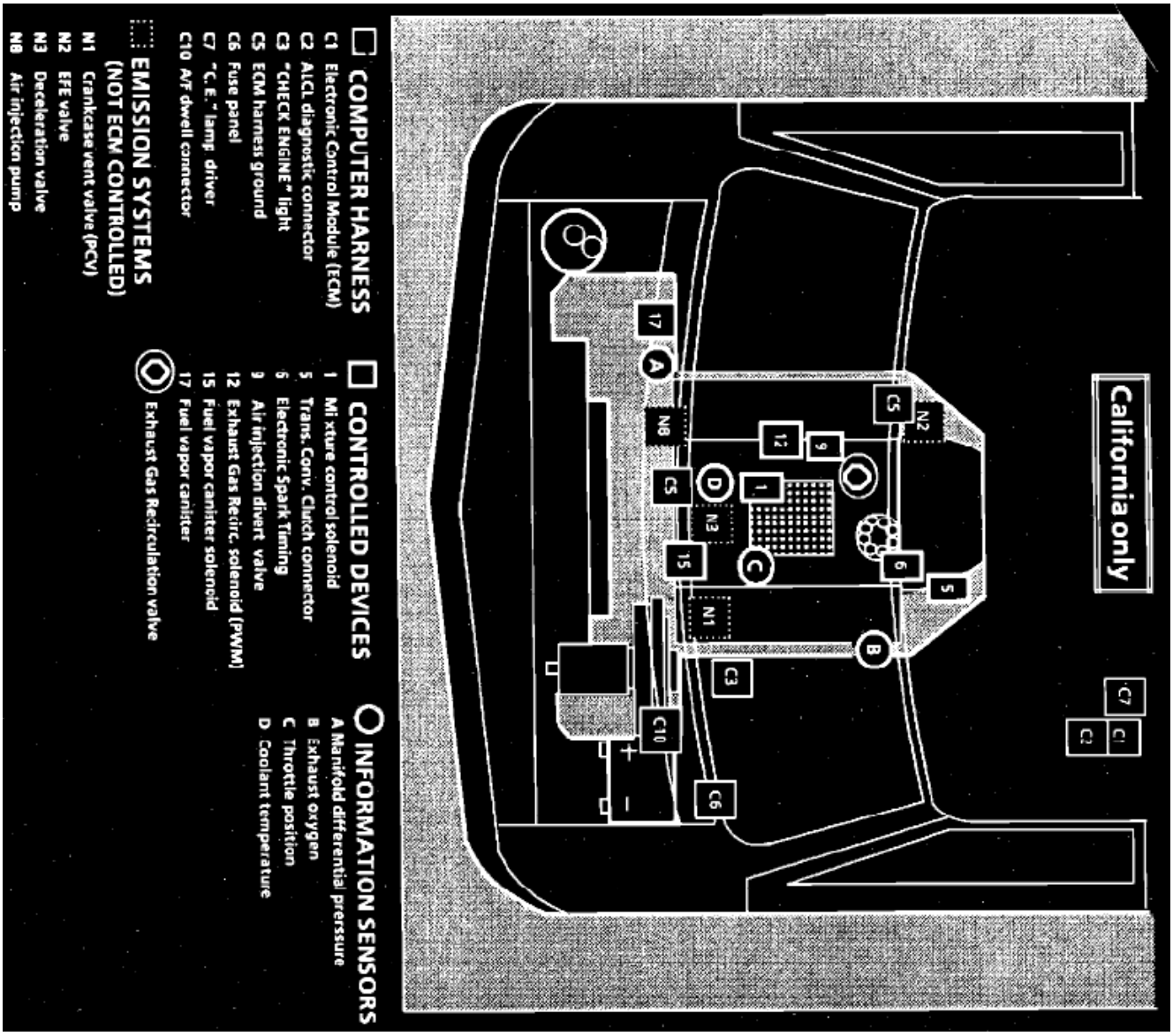
6. Remove metering rods and springs.

7. Remove throttle position sensor by pushing up from bottom of electrical connector and remove TPS and connector assembly from bowl.

8. Reverse procedure to install new TPS sensor using new air horn gasket.

Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
1984	2.0L	Y	.26	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Fig. 16 Throttle Position Sensor Specifications

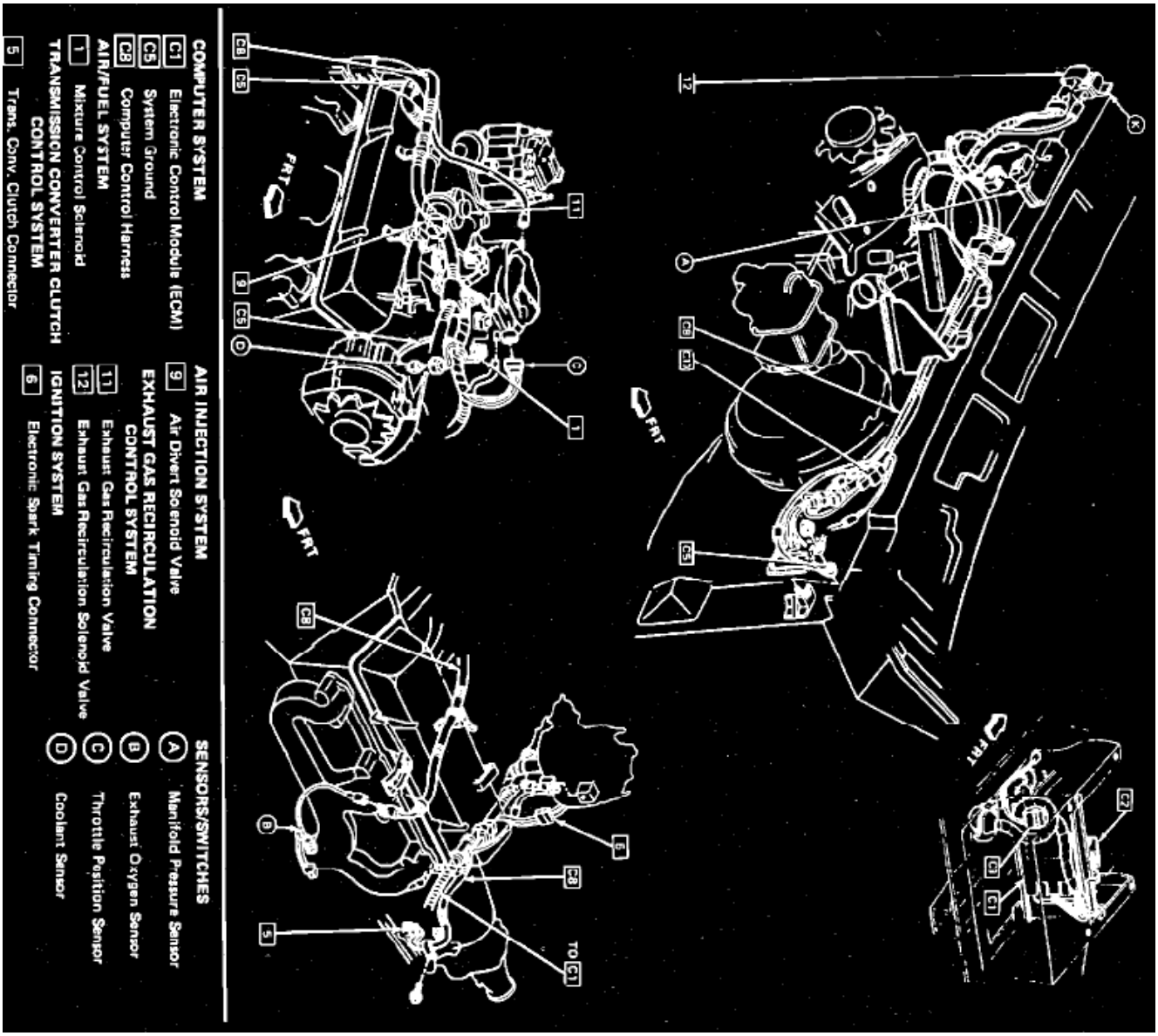


Throttle Position Sensor: Locations California

Underhood & Engine Components.

Top Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L California



Throttle Position Sensor: Locations Except California

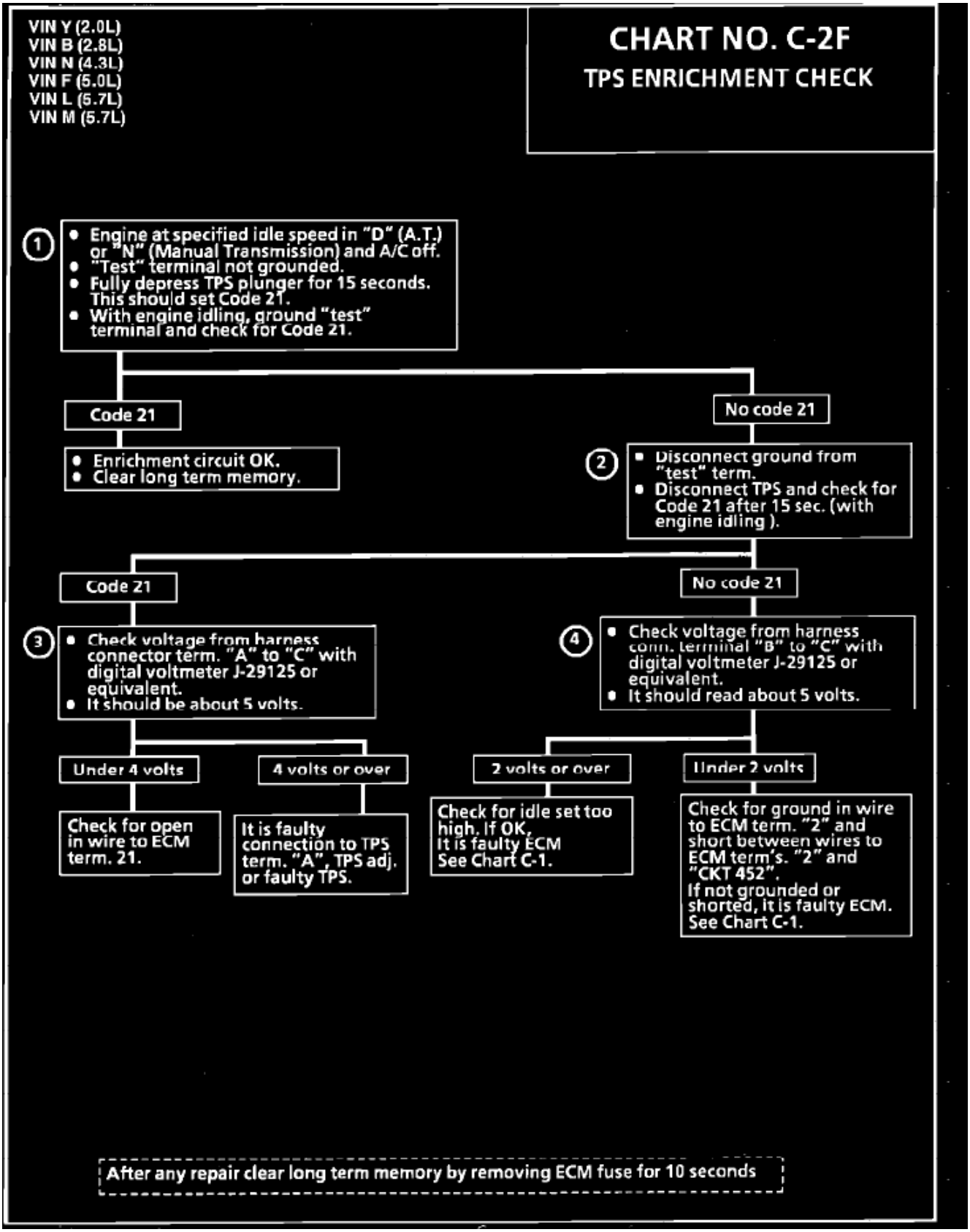
Engine Components.

LH Side Of Engine

Applicable to: 1985 G Series w/V8

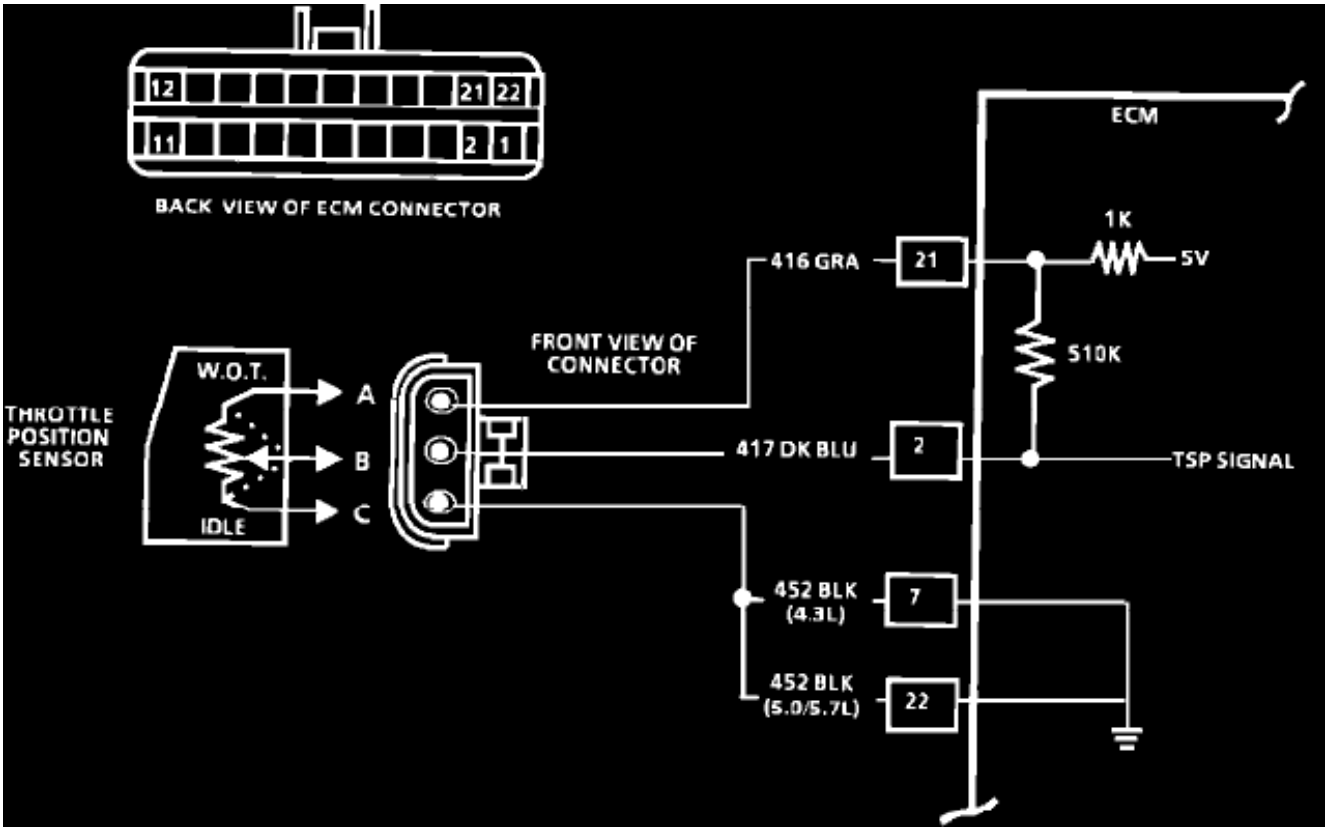
Throttle Position Sensor: Description and Operation

The TPS is mounted in the carburetor body and is moved by the accelerator pump linkage. When the throttle blades are closed, the TPS provides a low voltage (under 1 volt). This voltage signal will increase to up to 5 volts as the throttle blades are opened to wide open throttle. These voltage signals provide an indication of throttle position to the ECM.


VIN Y (2.0L)
VIN B (2.8L)
VIN N (4.3L)
VIN F (5.0L)
VIN L (5.7L)
VIN M (5.7L)
CHART NO. C-2F
TPS ENRICHMENT CHECK
1
• Engine at specified idle speed in "D" (A.T.) or "N" (Manual Transmission) and A/C off.
• "Test" terminal not grounded.
• Fully depress TPS plunger for 15 seconds. This should set Code 21.
• With engine idling, ground "test" terminal and check for Code 21.
Code 21
• Enrichment circuit OK.
• Clear long term memory.
No code 21
2
• Disconnect ground from "test" term.
• Disconnect TPS and check for Code 21 after 15 sec. (with engine idling).
Code 21
3
• Check voltage from harness connector term. "A" to "C" with digital voltmeter J-29125 or equivalent.
• It should be about 5 volts.
Under 4 volts
Check for open in wire to ECM term. 21.
4 volts or over
It is faulty connection to TPS term. "A", TPS adj. or faulty TPS.
No code 21
4
• Check voltage from harness conn. terminal "B" to "C" with digital voltmeter J-29125 or equivalent.
• It should read about 5 volts.
2 volts or over
Check for idle set too high. If OK, It is faulty ECM See Chart C-1.
Under 2 volts
Check for ground in wire to ECM term. "2" and short between wires to ECM term's. "2" and "CKT 452". If not grounded or shorted, it is faulty ECM. See Chart C-1.
After any repair clear long term memory by removing ECM fuse for 10 seconds

Throttle Position Sensor: Testing and Inspection

Chart C-2F - TPS Enrichment Check



Wiring Diagram for Chart C-2F - TPS Enrichment Check

CHART C-2F - TPS ENRICHMENT CHECK

Test Description:

1. This step checks that the TPS will cause an ECM "Rich" command when fully depressed manually. On some vehicles, this will cause a low dwell (full rich). On others it will not.

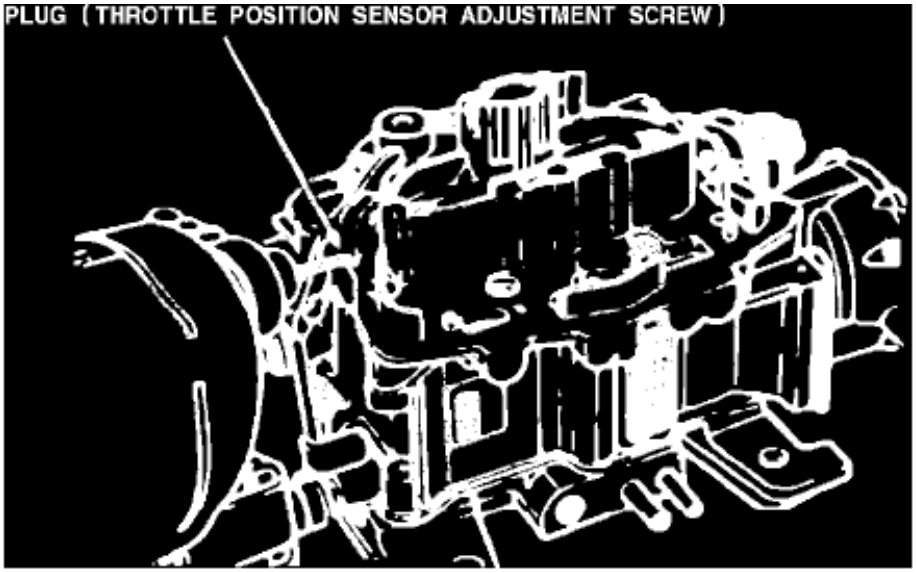
Code 21 should normally be set.

2. This step distinguishes between a faulty TPS or ECM harness/ECM.

Code 21 should normally be set, if engine RPM is not set above specifications.

3. This step checks for 5V. ref. at TPS. It should be about 5 volts. If loss of V. Ref were in the ECM, it should set Codes 21, 32 and 34 since this is the same 5V to VAC Sensor. Therefore, it must be an open in the wire.

4. This step checks for a grounded circuit. Normal circuit should read about 5 volts. Checking for grounded TPS output to Terminal "2" of ECM, or short in CKT 417 and 452 from TPS, indicates whether fault is in wiring or ECM. A voltmeter with a 10 megohms resistance must be used for an accurate reading.



Year	Engine (VIN Code)		Voltage	Throttle Position
1982	2.8L	B	.26	Curb Idle
	3.8L	A	.77	Curb Idle
	3.8L	K	.36	Curb Idle
	4.4L	J	.51	Curb Idle
1983	2.0L	Y	.20	Curb Idle
	2.8L	B	.26	Curb Idle
	3.8L	9	.36	Curb Idle
	3.8L	A	.86	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.51	Curb Idle
	5.0L	H	.51	Curb Idle
	5.7L	M	.41	Curb Idle
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	2.8L	B	.26	Curb Idle
	3.8L	A	.46	Curb Idle
	4.1L	D	.255	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	M	.41	Curb Idle
1985	2.8L	B	.27	Curb Idle
	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.48	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1986	4.3L	N	.25	Curb Idle
	5.0L	F	.41	Curb Idle
	5.0L	H	.54	Curb Idle
	5.7L	L	.41	Curb Idle
	5.7L	M	.41	Curb Idle
1987	5.0L	H	.54	Curb Idle

Throttle Position Sensor: Adjustments

Fig. 15 Throttle Position Sensor Adjustment Screw Cover Removal

Fig. 16 Throttle Position Sensor Specifications

Do not remove plug sealing TPS adjustment or adjust TPS unless carburetor is overhauled or ``Computer Command Control (C3)'' system

diagnosis indicates a problem with the switch.

1. Drill a .078 (5/64) inch hole, 1/16-1/8 inch deep, in plug covering TPS adjustment, Fig. 15.

2. Thread a No. 8 sheet metal screw into hole and pry out plug using a suitable lever.

3. Remove TPS adjusting screw using tool J-28696 or equivalent.

4. Leaving electrical connector in place, connect a digital voltmeter between TPS center terminal (B) and bottom terminal (C), using jumper wires if necessary. Only a digital voltmeter with 10 megohm input impedance or higher can be used. Conventional voltmeters do not have sufficient resistance to obtain accurate readings.

5. With ignition on, engine stopped and A/C off, install TPS screw and adjust quickly to obtain specified TPS idle voltage, Fig. 16.

6. Turn ignition off and install new plug over TPS adjusting screw or seal opening with RTV sealer.

Throttle Position Sensor: Service and Repair

To replace Throttle Position Sensor it is necessary to remove the air horn assembly from the carburetor.

1. Remove or disconnect electrical connectors from M/C solenoid and TPS assembly.

2. Air horn removal:

a. Remove upper choke lever from end of choke shaft by removing attaching screw. Rotate upper choke lever to remove lever from choke link.

b. Remove choke link from lower lever inside the float bowl casting. Remove link by holding lower lever outward with small screwdriver and twisting link counter-clockwise.

c. Remove the retainer from the pump link, and remove link from lever. DO NOT remove pump lever from air horn.

d. Remove vacuum break hose from tube on float bowl.

e. Remove air horn-to-bowl screws; then remove the two countersunk attaching screws located next to the venturi.

f. Remove air horn from bowl by lifting it straight up. (Gasket should remain on float bowl).

3. Remove solenoid-metering rod plunger by lifting straight up.

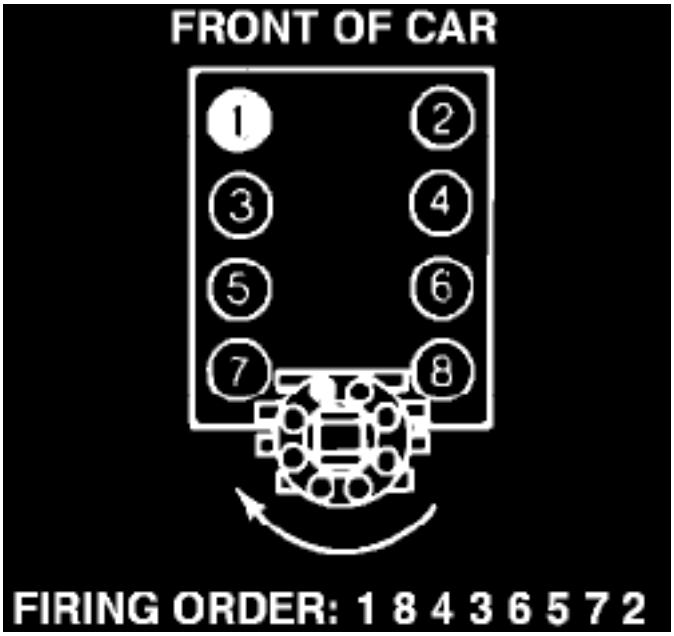
4. Remove air horn gasket by lifting it from the bowl locating pins on the float bowl. DISREGARD GASKET.

5. Remove float bowl insert.

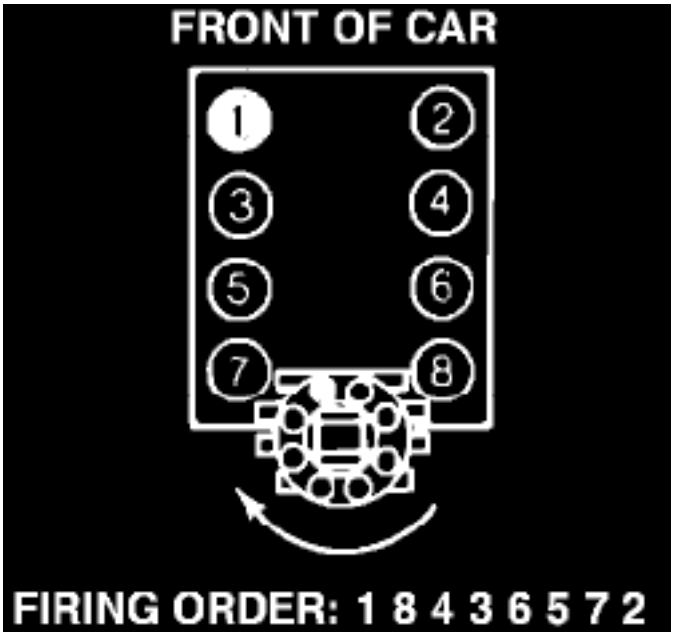
6. Remove metering rods and springs.

7. Remove throttle position sensor by pushing up from bottom of electrical connector and remove TPS and connector assembly from bowl.

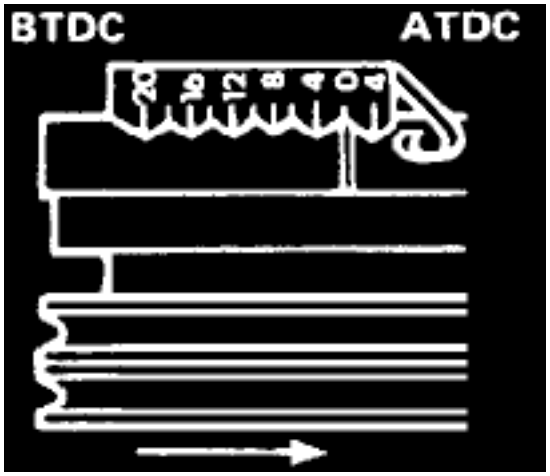
8. Reverse procedure to install new TPS sensor using new air horn gasket.

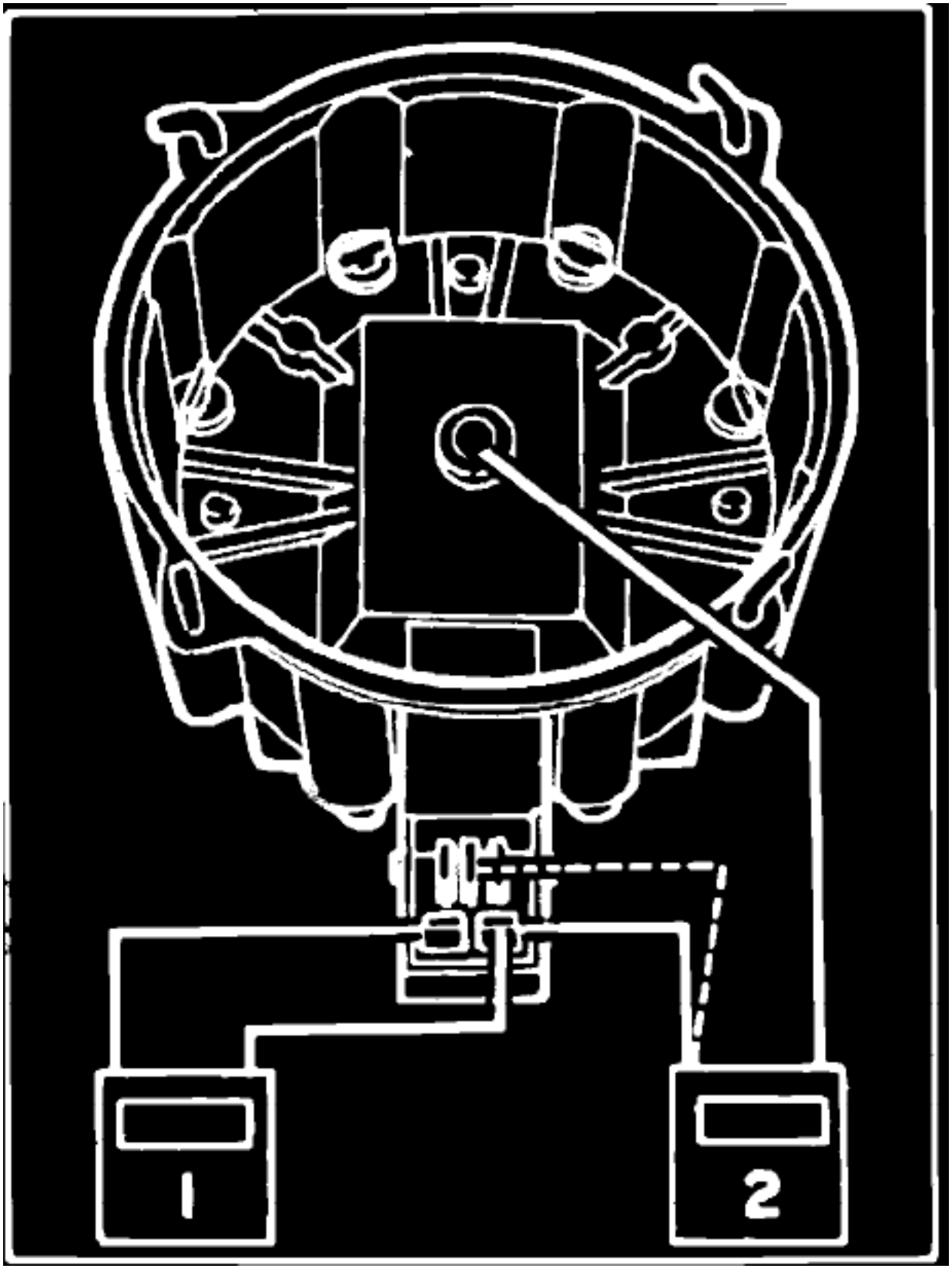


FIRING ORDER



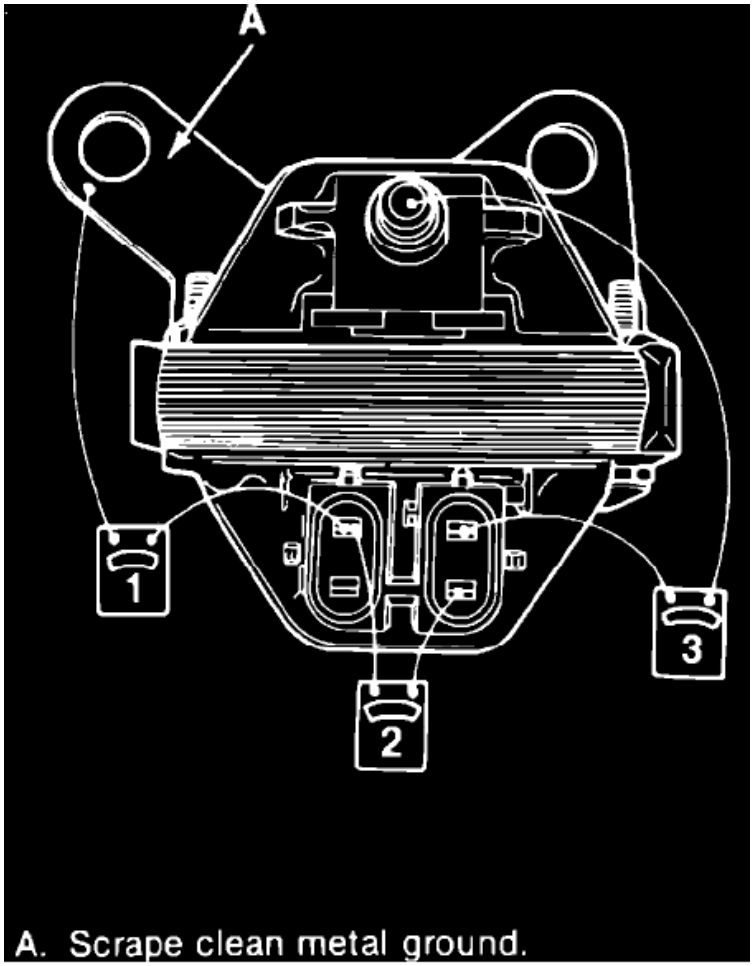
FIRING ORDER


BTDC
ATDC


1
2

Distributor: Testing and Inspection

Fig. 10 Ignition coil test connections. Models w/internal coil


A
1
2
3
A. Scrape clean metal ground.

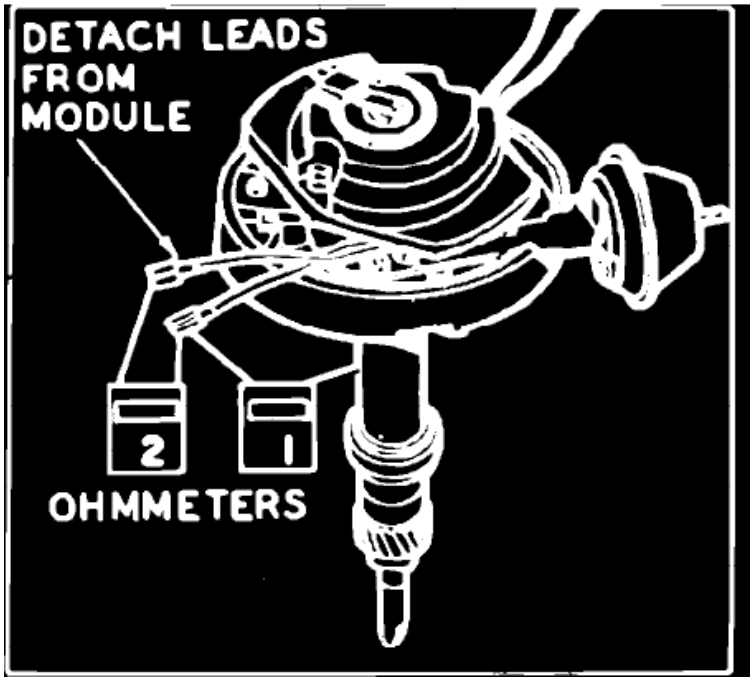

DETACH LEADS FROM MODULE
2
1
OHMMETERS

Fig. 11 Ignition coil test connections. Models w/remote coil

Fig. 12 Pickup coil (pole piece) test connections

Tester J-24624 is required to test the module. If this tester is not available, and malfunction still exists after performing the following checks, replace

module.

1. Remove distributor cap and coil assembly, as equipped.

2. Inspect cap, coil and rotor for arcing, carbon tracking and damage, and replace as needed.

3. On models with integral coil, proceed as follows:

a. Connect ohmmeter, Fig. 10, step 1. If reading is other than zero or very near to zero, the ignition coil must be replaced. b. If no ohmmeter reading was observed in step 1, reconnect ohmmeter both ways, Fig. 10, step 2. If both ohmmeter readings are infinite on

high scale, replace ignition coil.

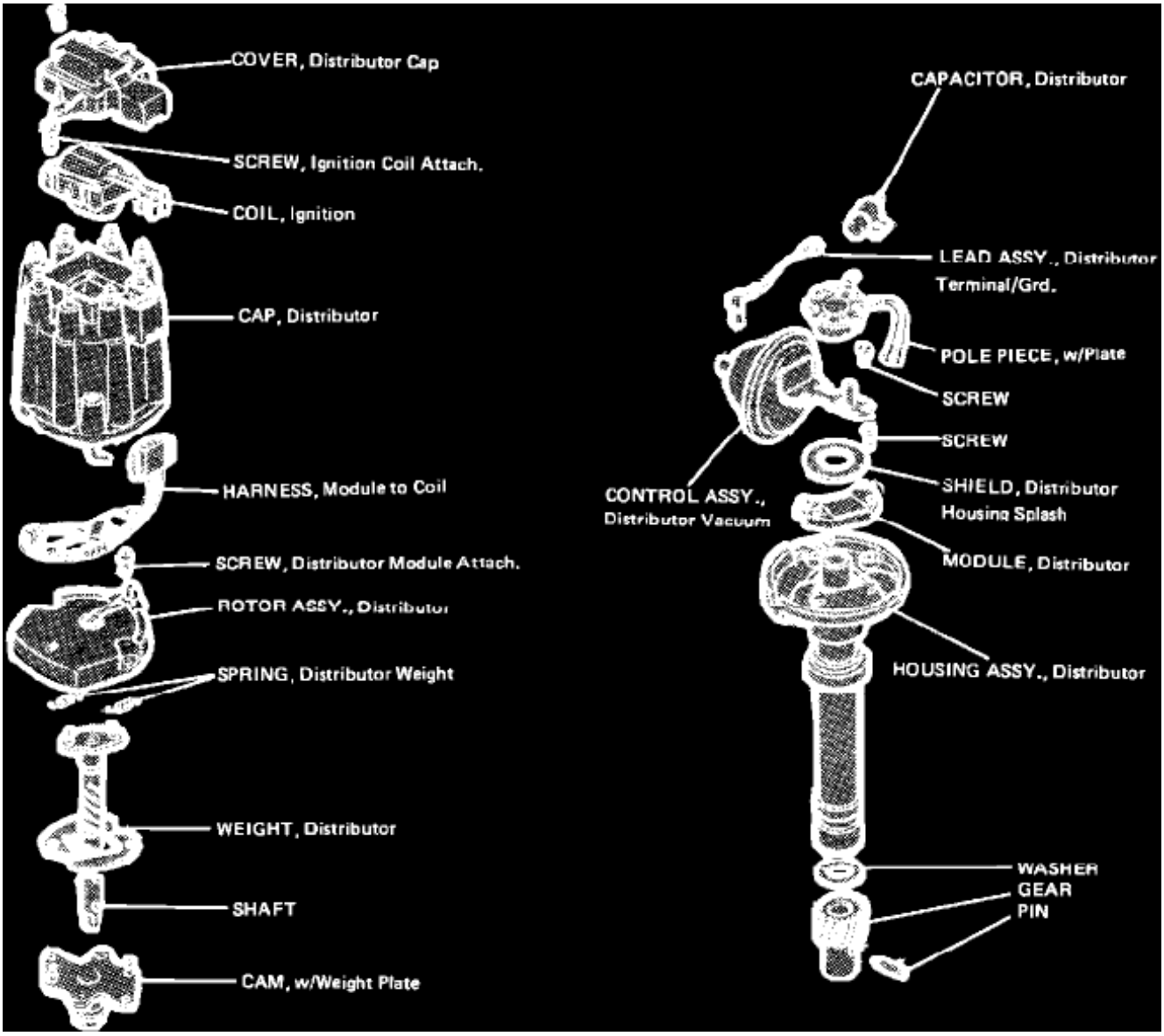
4. On models with remote coil, proceed as follows:

a. Connect ohmmeter, Fig. 11, step 1. If reading is not infinite, replace coil. b. Connect ohmmeter, Fig. 11, step 2. If reading is not zero or near zero, replace coil. c. Connect ohmmeter, Fig. 11, step 3. If reading is infinite, replace coil.

5. Connect an external vacuum source to the vacuum advance unit. Replace vacuum unit if inoperative.

6. If vacuum unit is operating properly, connect ohmmeter, Fig. 12, step 1. If ohmmeter reading on middle scale is not infinite at all times, pickup coil must be replaced.

7. With ohmmeter connected, Fig. 12, step 2, reading should be 500 to 1500 ohms.



Distributor: Service and Repair Distributor Service

Fig. 15 Typical High Energy Ignition (HEI) distributor exploded view

DISASSEMBLY

1. Remove distributor as outlined, then remove rotor, Fig. 15.

2. Remove advance springs and weights (if equipped).

3. Remove module retaining screws and move module to a position where connector may be removed.

4. Remove wires from module terminals.

5. Support distributor gear so that distributor shaft will not be damaged, then remove roll pin by driving it out with a punch.

6. Remove gear, shim and tanged washer from shaft. Remove any burrs that may have been caused by removal of roll pin. Some distributors do not use a shim or tanged washer.

7. Remove distributor shaft and magnet assembly.

8. Remove pole piece retaining screws, pole piece, magnet and pickup coil.

9. Remove lock ring from top of housing, pickup coil retainer and felt washer.

10. Remove vacuum advance unit (if equipped).

11. Remove capacitor and wiring harness from distributor housing.

ASSEMBLY

1. Install vacuum advance unit (if used) and secure with two screws, Fig. 15.

2. Place felt washer over lubricant reservoir at top of housing.

3. Position pick up coil retainer onto housing with vacuum advance arm over actuating pin of vacuum advance mechanism and secure with lock ring.

4. Install pick up coil magnet and pole piece. Loosely install the three retaining screws.

5. Install distributor shaft and rotate to check for even clearance all around between pole piece and shaft projections.

6. Move pole piece to provide even clearance and secure with three retaining screws.

7. Install drive onto shaft with teeth facing up. Drive gear has a dimple on one side next to drive pin hole. Align drive gear so that dimple is on same

side of shaft as the rotor pointer. Temporarily install rotor to ensure correct alignment.

8. Install tanged washer, shim and drive gear, then retain with a new roll pin.

9. Install capacitor and loosely install retaining screw.

10. Install connector on module with tab on top, then liberally apply silicone grease to bottom of module and install screws. Failure to apply silicone grease to module will cause excessive heat build up of module and premature failure.

11. Position wiring harness with grommet in housing notch, then connect pink wire to capacitor stud and black wire to capacitor retaining screw. Tighten screw.

12. Reconnect wires to module, then install centrifugal advance weights and springs.

Distributor: Service and Repair Distributor Replace

UNITS W/INTEGRAL COIL

Removal

1. Disconnect electrical connectors from distributor cap and disconnect 4 wire EST connector. Carefully bend connector locking tabs away from housing by hand to prevent damage to locking tabs.

2. Remove distributor cap assembly leaving plug wires connected and position cap aside.

3. Remove No. 1 spark plug, crank engine until compression pressure can be felt in No. 1 cylinder, then slowly rotate crankshaft until timing marks are aligned at TDC on compression stroke for No. 1 cylinder.

4. Disconnect battery ground cable, then mark position of distributor body in relation to engine and position of rotor contact in relation to distributor body.

5. Remove distributor hold-down bolt, raise distributor noting rotor rotation, place second mark on distributor housing to indicate position where rotor stops moving, then remove distributor. Do not rotate crankshaft with distributor removed from engine.

Installation

1. Ensure No. 1 cylinder is at TDC on compression stroke as outlined in removal procedure.

2. Align rotor with second mark made in step 5 of removal procedure.

3. Insert distributor into engine, aligning body with mark made on engine prior to removal, then seat distributor in engine. With distributor fully seated, marks made in step 4 of removal procedure should be aligned. If distributor will not seat against boss on engine, oil pump driveshaft may have to be rotated slightly to allow proper installation.

4. Install hold-down clamp and hand tighten retaining bolt.

5. Reverse remaining procedure to complete installation, then adjust ignition timing as outlined.

UNITS W/REMOTE COIL

Removal

1. Disconnect distributor harness and feed wire connectors from ignition coil and disconnect EST connector.

2. Remove distributor cap leaving plug wires connected and position cap aside.

3. Remove No. 1 spark plug, crank engine until compression pressure can be felt in No. 1 cylinder, then slowly rotate crankshaft until timing marks are aligned at TDC on compression stroke for No. 1 cylinder.

4. Disconnect battery ground cable, then mark position of distributor body in relation to engine and position of rotor contact in relation to distributor body.

5. Remove distributor hold-down bolt, raise distributor noting rotor rotation, place second mark on distributor housing to indicate position where rotor stops moving, then remove distributor. Do not rotate crankshaft with distributor removed from engine.

Installation

1. Ensure No. 1 cylinder is at TDC on compression stroke as outlined in removal procedure.

2. Align rotor with second mark made in step 5 of removal procedure.

3. Insert distributor into engine, aligning body with mark made on engine prior to removal, then seat distributor in engine. With distributor fully seated, marks made in step 4 of removal procedure should be aligned. If distributor will not seat against boss on engine, oil pump driveshaft may have to be rotated slightly to allow proper installation.

4. Install hold-down clamp and hand tighten retaining bolt.

5. Reverse remaining procedure to complete installation, then adjust ignition timing as outlined.

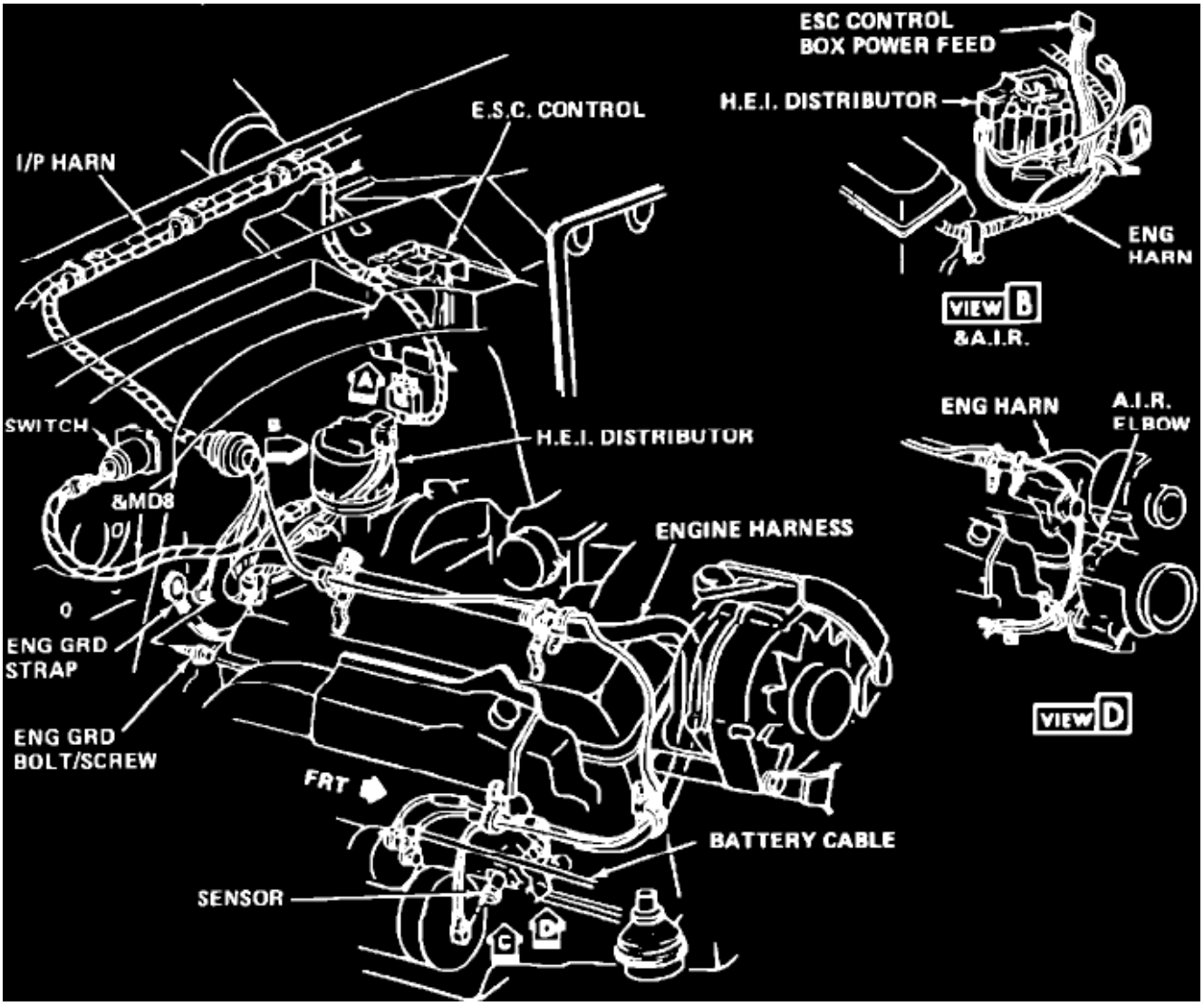


Fig. 46 Typical Electronic Spark System (ESC)

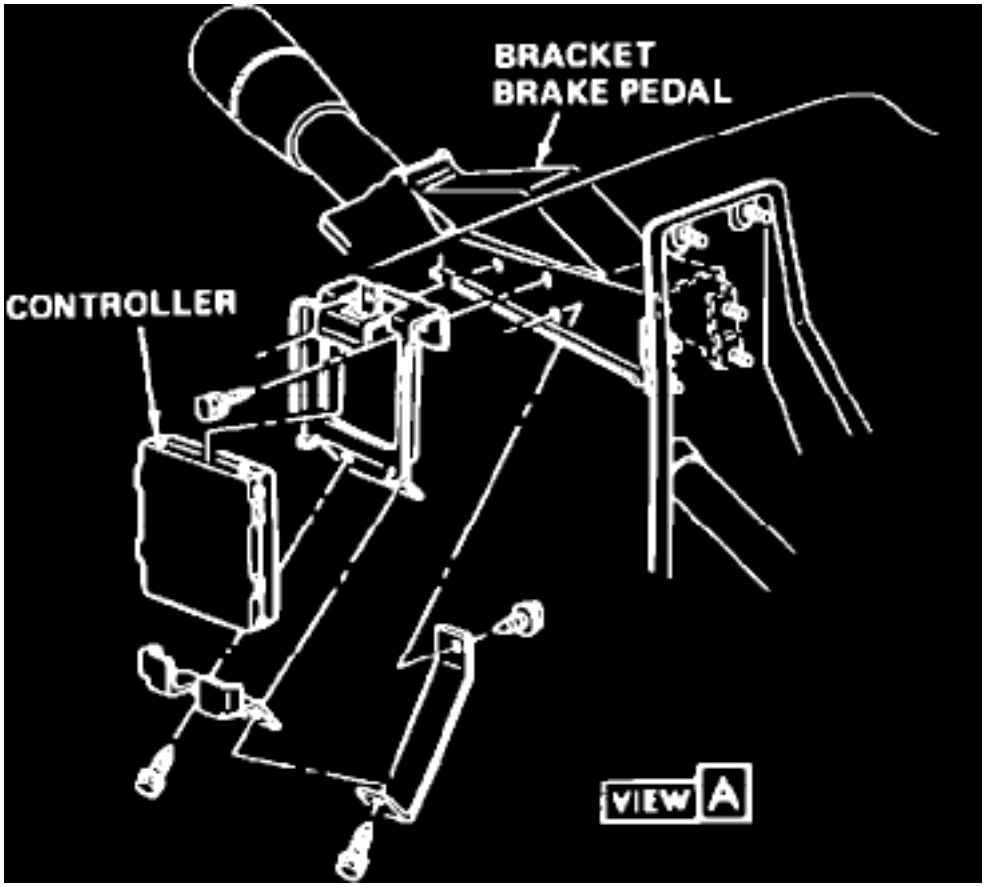
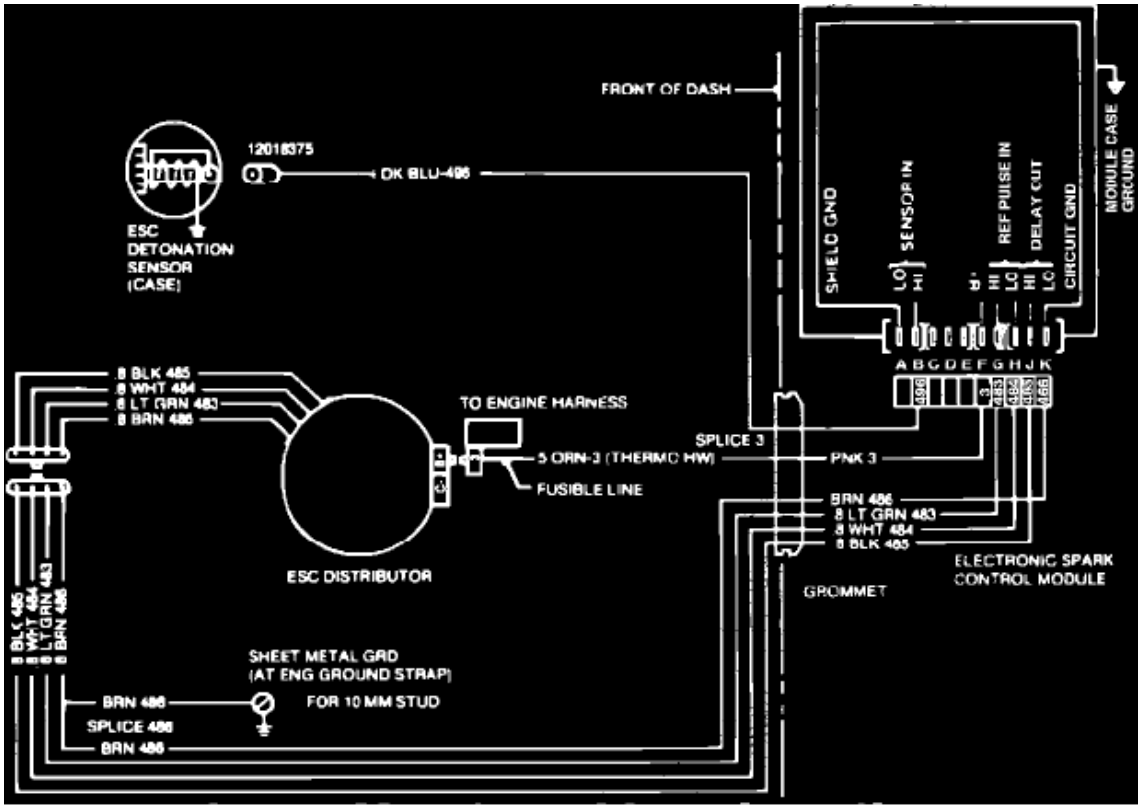
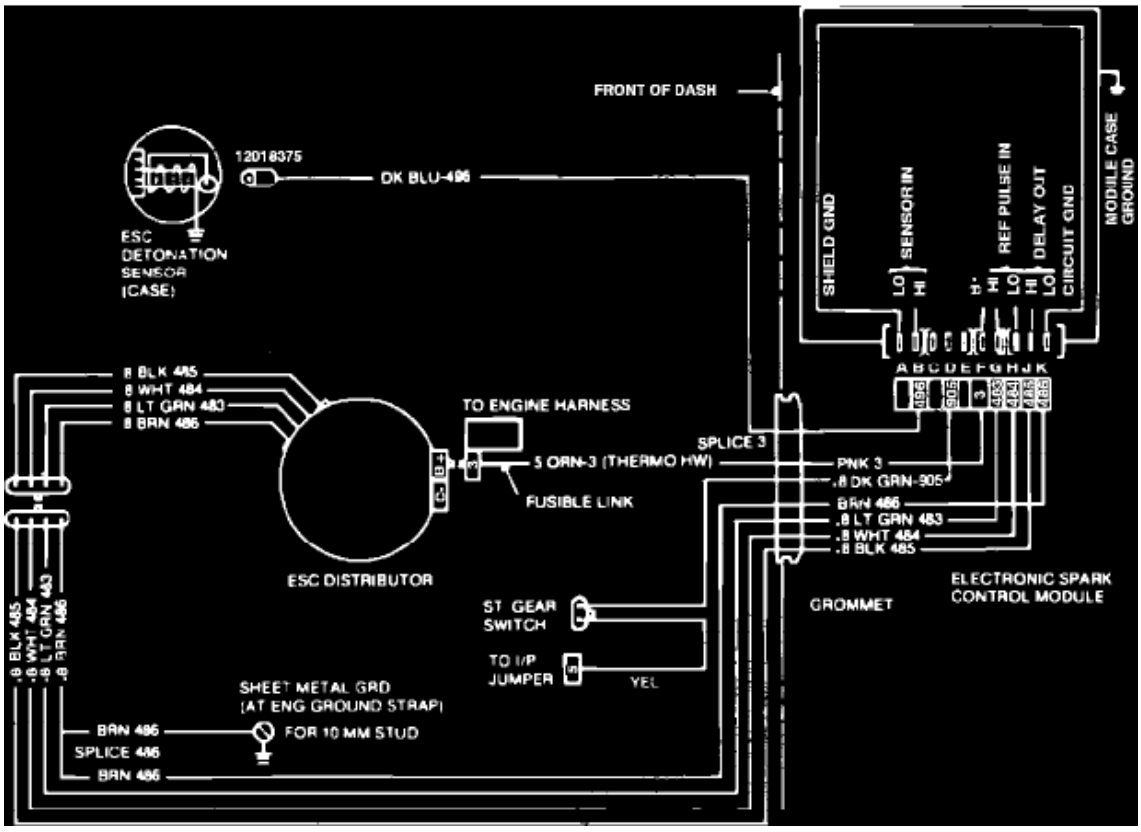


Fig. 47 Typical ESC Controller


FRONT OF DASH
12018375
DK BLU-496
ESC DETONATION SENSOR (CASE)
SHIELD GND
SENSOR IN
REF PULSE IN
DELAY OUT
CIRCUIT GND
MODULE CASE GROUND
A B C D E F G H J K
8 BLK 485
8 WHT 484
8 LT GRN 483
8 BRN 486
TO ENGINE HARNESS
SPLICE 3
5 ORN-3 (THERMO HW)
PNK 3
FUSIBLE LINE
BRN 486
8 LT GRN 483
8 WHT 484
8 BLK 485
ESC DISTRIBUTOR
GROMMET
ELECTRONIC SPARK CONTROL MODULE
SHEET METAL GRD (AT ENG GROUND STRAP)
BRN 486
FOR 10 MM STUD
SPLICE 486
BRN 486


FRONT OF DASH
12018375
DK BLU-496
ESC DETONATION SENSOR (CASE)
SHIELD GND
SENSOR IN
REF PULSE IN
DELAY OUT
CIRCUIT GND
MODULE CASE GROUND
A B C D E F G H J K
8 BLK 485
8 WHT 484
8 LT GRN 483
8 BRN 486
TO ENGINE HARNESS
SPLICE 3
5 ORN-3 (THERMO HW)
PNK 3
.8 DK GRN-905
FUSIBLE LINK
BRN 486
.8 LT GRN 483
.8 WHT 484
.8 BLK 485
ESC DISTRIBUTOR
ST GEAR SWITCH
TO I/P JUMPER
YEL
GROMMET
ELECTRONIC SPARK CONTROL MODULE
SHEET METAL GRD (AT ENG GROUND STRAP)
BRN 486
FOR 10 MM STUD
SPLICE 486
BRN 486

Electronic Spark Timing: Testing and Inspection

Use the following procedures to diagnose ESC system malfunctions only. To diagnose general ignition system malfunctions, refer to ``High Energy Ignition (HEI) System Diagnosis.''

Fig. 5 ESC system wiring schematic. 1984-86 models w/manual 4 speed top loader transmission

Fig. 6 ESC system wiring schematic. 1984-86 models w/manual 3 & 4 speed side loader transmission

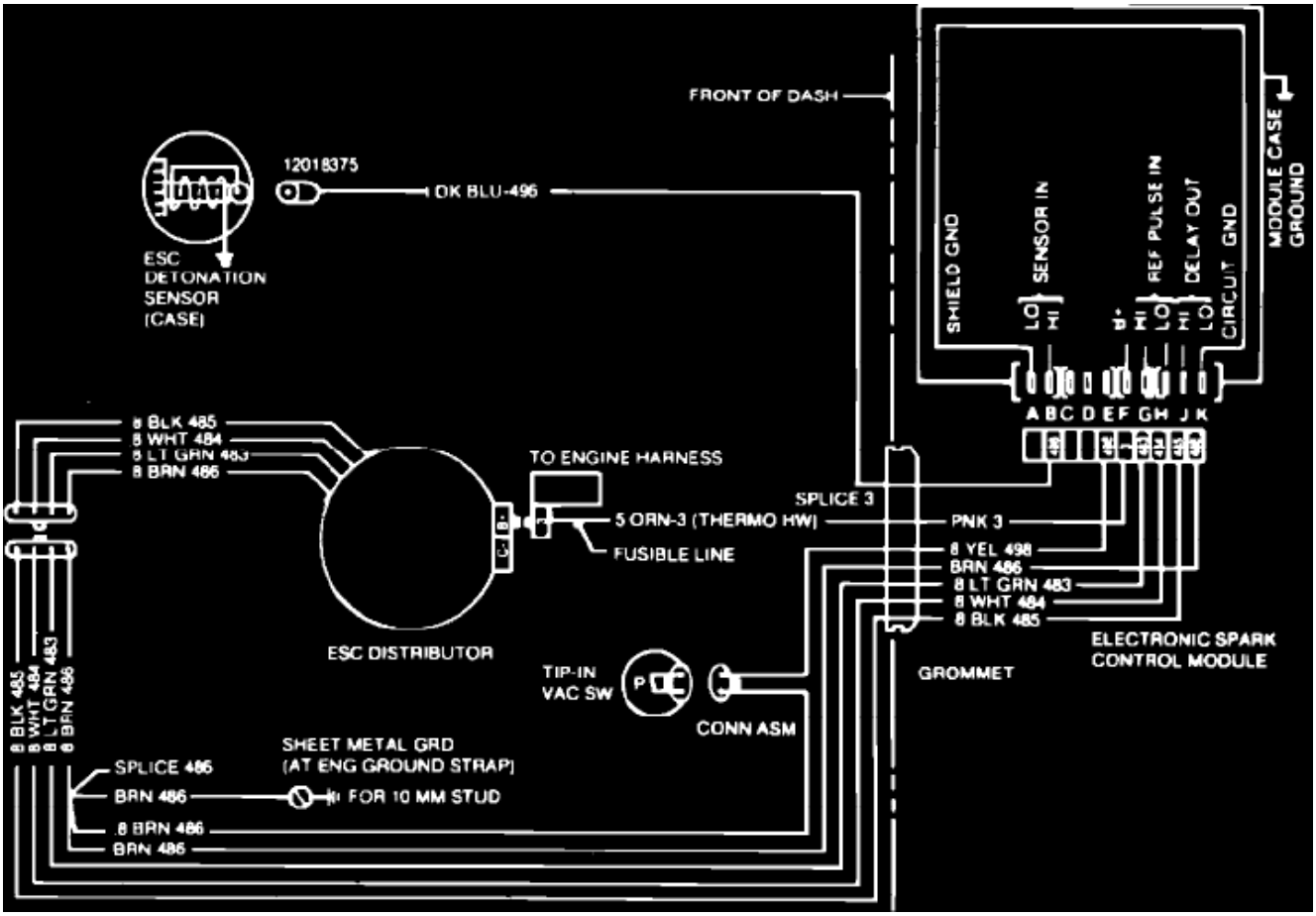


Fig. 7 ESC system wiring schematic. 1984-86 models w/auto. trans.

1984-86 MODELS

Engine Cranks But Will Not Start

1. Check for spark at at the ends of at least 2 spark plug wires using tester ST-125 or equivalent. If spark is observed, malfunction is not in ignition system.

2. If no spark is observed, disconnect 4 pin connector to distributor, connect jumper wire between pins A and C on distributor side of connector, Figs. 5, 6 and 7, and attempt to start engine. If engine starts, proceed to step 3. If engine does not start, proceed as follows:

a. Remove jumper wire and reconnect 4 pin connector to distributor. Turn on ignition and measure voltage at pins F and K of controller 10 pin

connector. If voltage is less than 11.6 volts, check feed circuit and repair as needed.

b. Set voltmeter on 2 volt scale and measure voltage between pins J and K of 10 pin connector while cranking engine. If reading is .75 volts or

greater, ESC system is satisfactory.

c. Set voltmeter on 2 volt scale and measure voltage between pins G and H of 10 pin connector while cranking engine. If reading is .20 volt or

greater, controller is defective. If reading is less than .20 volt, pole piece is defective.

3. Stop engine and remove jumper wire from distributor.

4. Connect suitable high resistance test lamp between distributor TACH terminal and ground, then turn on ignition. If test lamp lights, proceed to step 6.

5. If lamp does not light at TACH terminal, connect lamp between BAT terminal and ground and turn on ignition. If lamp does not light, repair feed circuit to ignition.

6. Crank engine with test lamp connected between distributor TACH terminal and ground. If test lamp flickers, system is satisfactory.

7. If test lamp does not flicker as engine is cranked, connect lamp between BAT terminal and pin A on distributor side of 4 pin ESC connector, then tap on coil. If coil makes a clicking noise when tapped, pole piece is defective.

8. If coil does not click, remove distributor cap an disconnect and reconnect pole piece electrical connector. If coil still does not click when tapped, ignition module is defective.

Poor Engine Performance

1. Disconnect distributor 4 pin connector, connect pins A and C on distributor side of connector with jumper wire, and road test vehicle.

2. If engine performance is still poor, cause is not in ESC system. If proper engine performance is restored by disconnecting ESC controller from distributor, remove jumper wire, reconnect 4 pin connector and proceed to next step.

3. Disconnect 10 pin connector from ESC controller, inspect terminals for proper contact, shots and opens, repair as needed, then recheck system operation.

4. If problem persists, disconnect 10 pin connector and measure resistance between pins B and K in connector. Reading should be 98-99 Kohms.

5. If resistance is not as specified, disconnect electrical connector from knock sensor and measure resistance between sensor terminal and ground. If resistance is 98-99 ohms, repair wiring between knock sensor and controller. If resistance is not 98-99 Kohms, knock sensor is defective.

6. Reconnect 10 pin connector to controller and measure voltage between pins F and K with ignition on. If voltage reading is less than 11.6 volts repair feed circuit as needed.

7. Set voltmeter on 20 volt AC scale and measure voltage between connector pins H and K with ignition on. If reading is less than .20 volt, inspect system wiring and repair as needed. If reading is greater than .20 volt, ensure all connectors are properly seated, then road test vehicle. If problem persists, replace ESC controller.

Engine Detonation

1. Inspect connector and wiring to knock sensor and repair as needed.

2. Connect suitable spark advance tester to engine, run engine until it reaches normal operating temperature and set engine to run at a minimum of 1200 RPM, then observe ignition timing while tapping on exhaust manifold. If ignition timing retards when manifold is tapped, ESC system is operating properly.

3. Stop engine, disconnect 10 pin connector from ESC controller and measure resistance between pins B and K of connector. If resistance is not 98-99 ohms, proceed to step 5.

4. Measure resistance between pins H and K in connector. If resistance is 14-16 ohms, replace controller. If resistance is not 14-16 ohms, repair wiring to controller.

5. Disconnect electrical connector from knock sensor and measure voltage at sensor terminal with engine running at 2000 RPM. If reading is not .08 volt or more, knock sensor is defective.

6. Stop engine. If knock sensor voltage output is satisfactory, check wiring between knock sensor and terminal B of controller and between controller terminal K and ground and repair as needed.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Ignition System > Spark Plug Wire <--> [Ignition Cable] > Component Information > Technical Service Bulletins > Customer Interest for Spark Plug Wire: > 93356D > Oct > 92 > Engine - Miss, Hesitation, or Roughness

Spark Plug Wire: Customer Interest Engine - Miss, Hesitation, or Roughness

Number: 93-35-6D Section: 6D Date: OCT. 1992 Corporate Bulletin No.: 716404R ASE No.: A1, A8

Subject: ENGINE MISS HESITATION OR ROUGHNESS DUE TO PIERCED SECONDARY IGNITION COMPONENTS

Model and Year: 1980-93 ALL PASSENGER CARS AND TRUCKS

THIS BULLETIN CANCELS AND SUPERSEDES DEALER SERVICE BULLETIN NO. 87-121, DATED MAY 1987. THE 1989-93 MODEL YEARS HAVE BEEN ADDED. ALL COPIES OF 87-121 SHOULD BE DISCARDED.

During the diagnosis procedure for an engine miss, hesitation or roughness, a spark plug or spark plug wire condition may be suspected. Several types of commercial or homemade diagnostic equipment required the secondary ignition boots or wire to be pierced. This is normally done to check for spark plug firing or to perform a cylinder balance test. Similarly the use of pliers or other such tools to disengage a spark plug boot may pierce or damage the boot or wire. Secondary ignition components should not be pierced for any reason.

Piercing a spark plug wire and/or distributor boot may create a condition that will not be immediately apparent. Over time, the hole in the pierced boot may allow a ground path to develop creating a plug misfire condition. Heavily moisture laden air in the vicinity of the pierced boot may accelerate this effect.

Piercing a secondary ignition wire creates a gap in the wire's conductive core. This gap is a point of high resistance. The current flow in the wire will increase to compensate for the higher wire resistance. Over time, the wire may fail creating a plug misfire condition. The time required for the condition to appear depends upon the extent of damage to the conductive core.

To help prevent future condition that are spark plug wire related, do not pierce or otherwise damage any secondary ignition component. Only use diagnostic equipment containing an inductive pick-up to check for spark plug firing or to perform cylinder balance tests. When disengaging a spark plug boot from the spark plug, twist the flanged boot 1/2 turn then pull on the boot only to remove the wire.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Ignition System > Spark Plug Wire <--> [Ignition Cable] > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Spark Plug Wire: > 93356D > Oct > 92 > Engine - Miss, Hesitation, or Roughness

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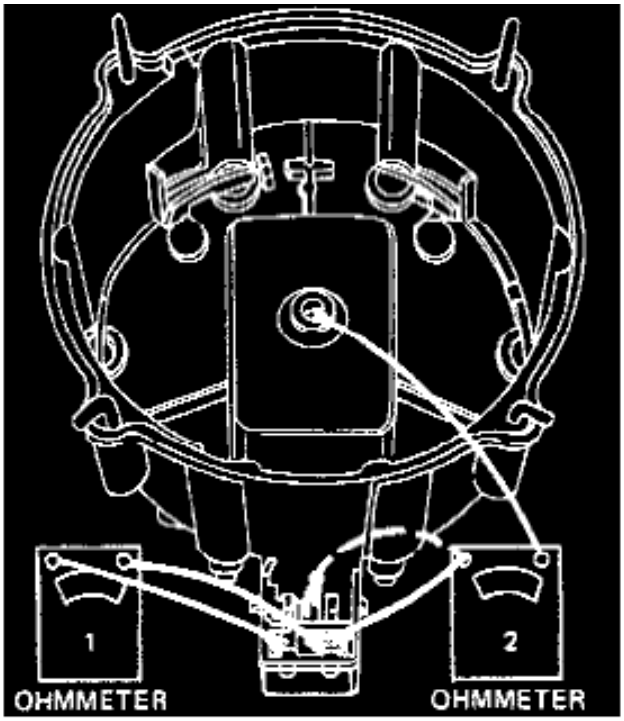
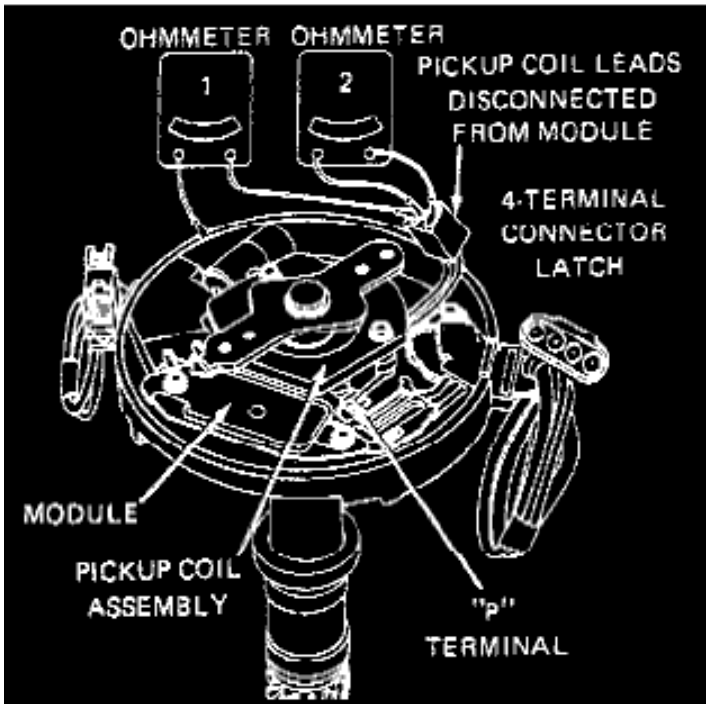
Winding Resistance (ohms at 75°F or 24°C)

Engine	Year	Windings	Resistance (ohms)
1.9L (119)	1982-83	Primary	.90-1.40
		Secondary	7300-11,100
1.9L (119)	1984-85	Primary	1.13-1.53
		Secondary	10,200-13,800
All Others	1981-90	Primary	0-2
		Secondary	6000-30,000

IGNITION COIL


1
2
OHMMETER
OHMMETER


OHMMETER
OHMMETER
1
2
PICKUP COIL LEADS DISCONNECTED FROM MODULE
4-TERMINAL CONNECTOR LATCH
MODULE
PICKUP COIL ASSEMBLY
"P" TERMINAL

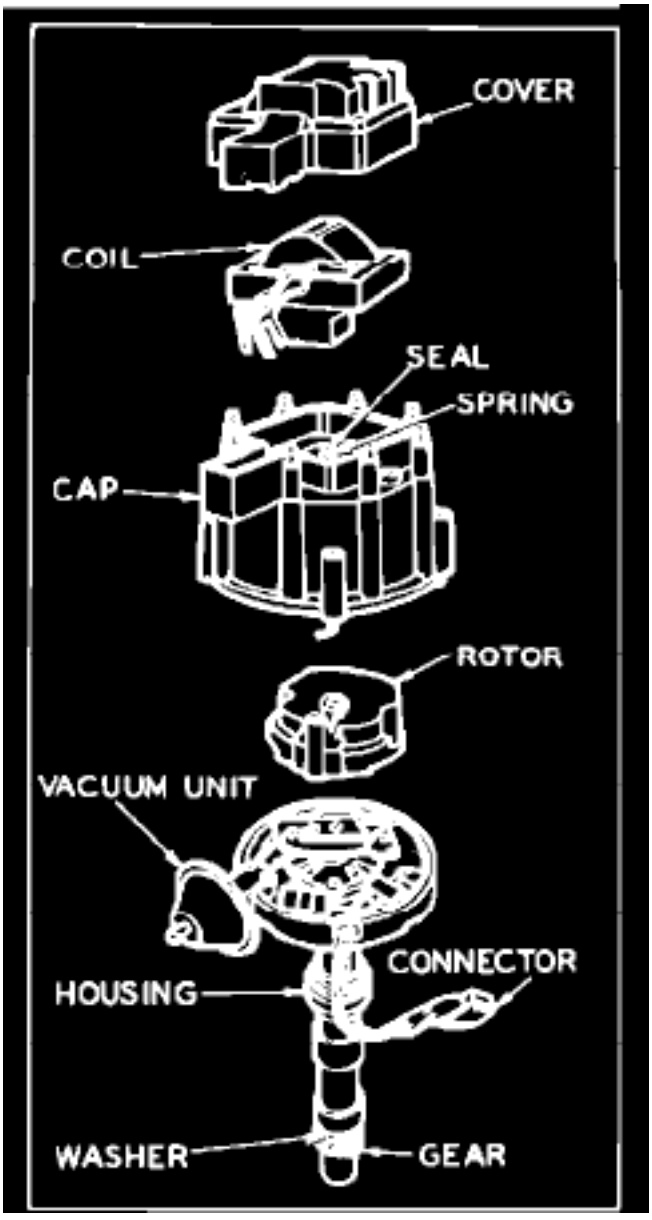
Ignition Coil: Testing and Inspection

IGNITION COIL TEST

Connect ohmmeter. Test 1 Reading shouid be zero. or nearly zero. If not. replace coil. Connect ohmmeter both ways. Test 2. Use high scale. Replace coil only if both readings are infinite. If coil is good, go down to Pickup coil test.

PICKUP COIL TEST

On all distributors,including distributors with hall effect switch, remove rotor and pickup coil leads from module. Connect ohmmeter test 1 and then test 2. If vacuum unit is used, connect vacuum source to vacuum unit.Replace unit if inoperative.Observe ohmmeter throughout vacuum range; flex leads by hand without vacuum to check for intermittent opens. Test 1- should read infinite at all times. Test 2- should read steady at one value within 500-1500 ohm range. NOTE:Ohmmeter may deflect if operating vacuum unit causes teeth to align.This is not a defect.



Ignition Coil: Service and Repair

Fig. 2 High Energy Ignition (HEI) distributor internal components. Internal coil unit shown

Units With Internal Coil

1. Remove screws holding distributor cover to distributor cap and remove distributor cover, Fig. 2.

2. Remove four screws holding coil to cap.

3. Remove harness connector and battery wire from side of distributor cap.

4. Push coil leads out of position in cap and remove coil.

5. Reverse procedure to install.

Units With External Coil

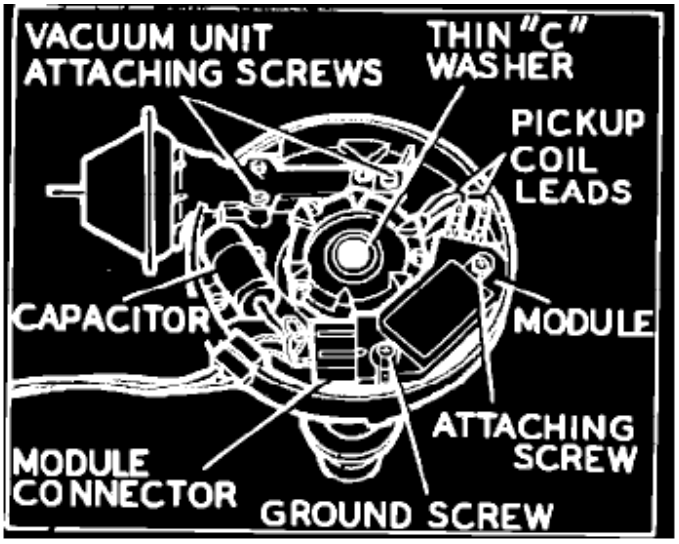
1. Disconnect ignition switch to coil lead from coil.
2. Disconnect coil to distributor leads from coil.
3. Remove coil to engine retaining screws and remove coil.
4. Reverse procedure to install.

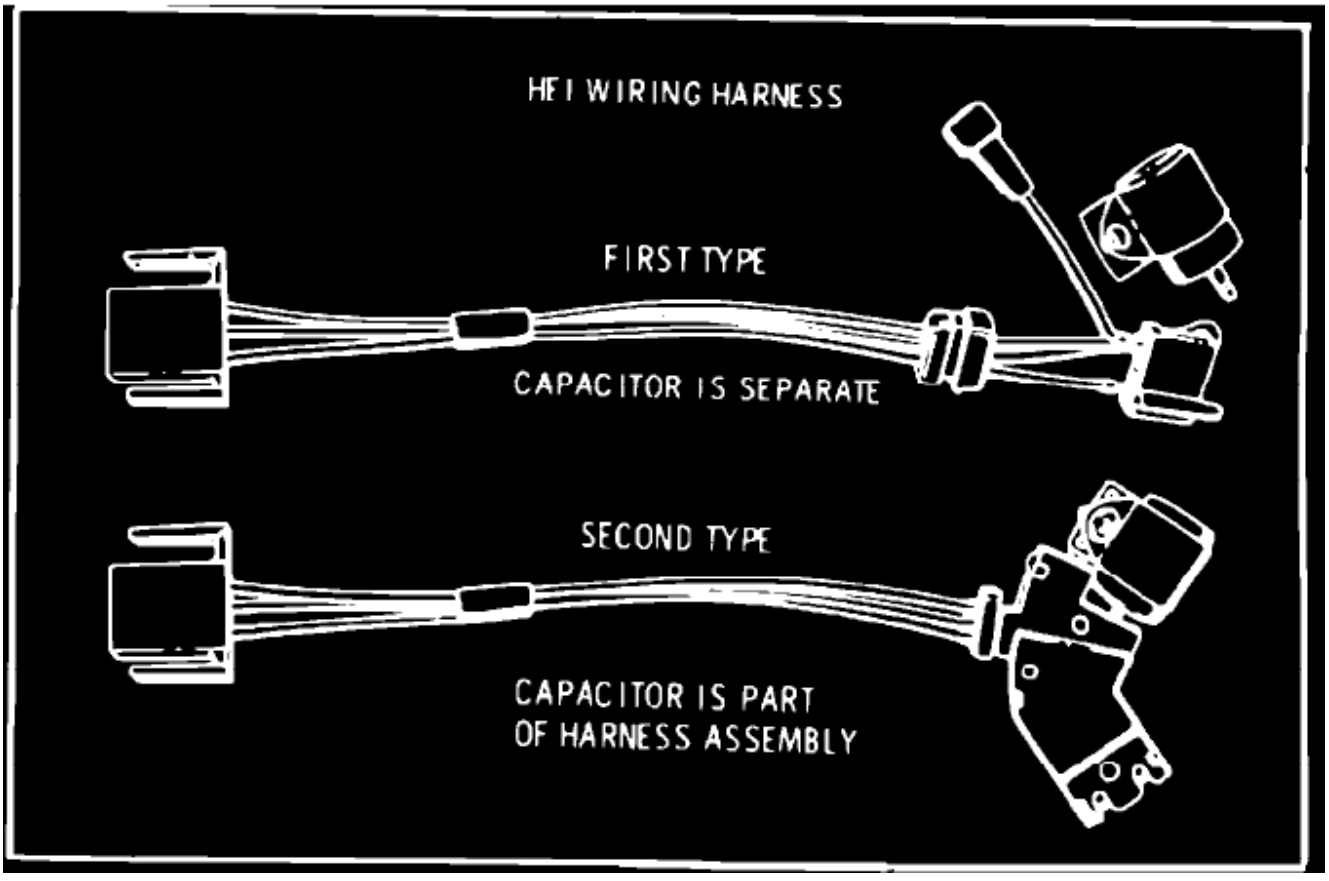
Ignition Control Module: Testing and Inspection

If the vehicle cranks for at least 5 seconds and the Engine Control Module doesn't see a referance signal, some Models will set a code, 42 (Hard) or 12 (Soft). If your vehicle has one of these codes, begin with the Diagnostic System Check in Computers and Controls, then proceed to the Trouble Code Chart (Yes, some vehicles have a DTC Chart for Code 12).

If the vehicle does not set a code, begin with the Diagnostic System Check, and it will send you to a Diagnostic Chart that checks for your particular condition.

These types of tests are found under Computers and Control Systems. See: Computers and Control Systems/Testing and Inspection





Ignition Control Module: Service and Repair

Fig. 13 Distributor component identification

Fig. 14 Ignition module harness identification

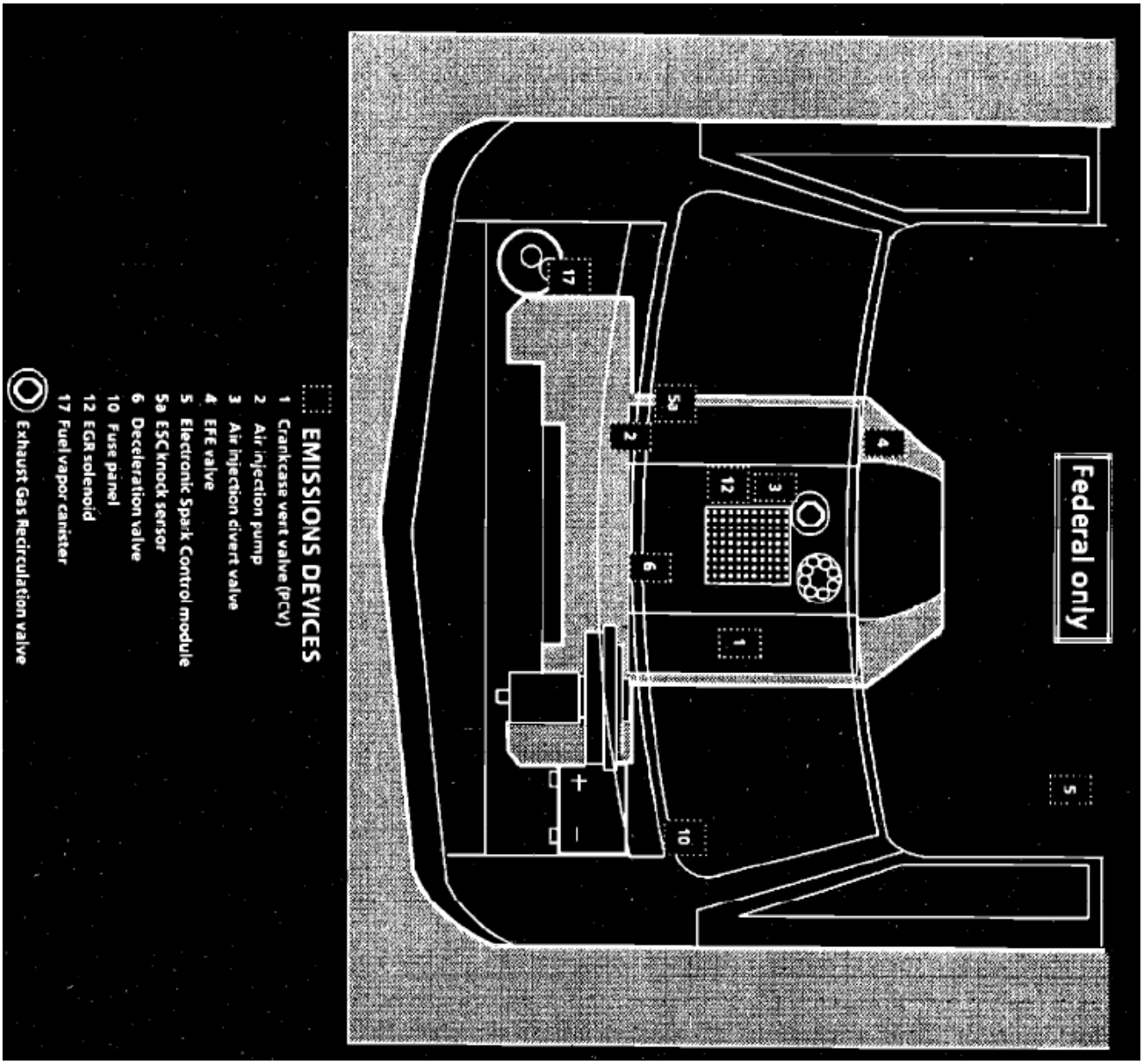
1. Disconnect wiring harness connector at side of distributor cap and remove distributor cap.

2. Remove rotor and disconnect wires from module terminals.

3. Remove two mounting screws and remove module, Fig. 13. Two types of H.E.I. wiring harness are used, Fig. 14. The second type is a wiring harness, connector and capacitor which is serviced as an assembly.

4. Reverse procedure to install. Prior to installation, coat bottom of new module with dielectric grease (furnished with new module) to aid in heat transfer into distributor housing. Failure to apply grease will cause excessive heat at module and premature module failure.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Ignition System > Knock Sensor > Component Information > Locations > Electronic Spark Control Knock Sensor

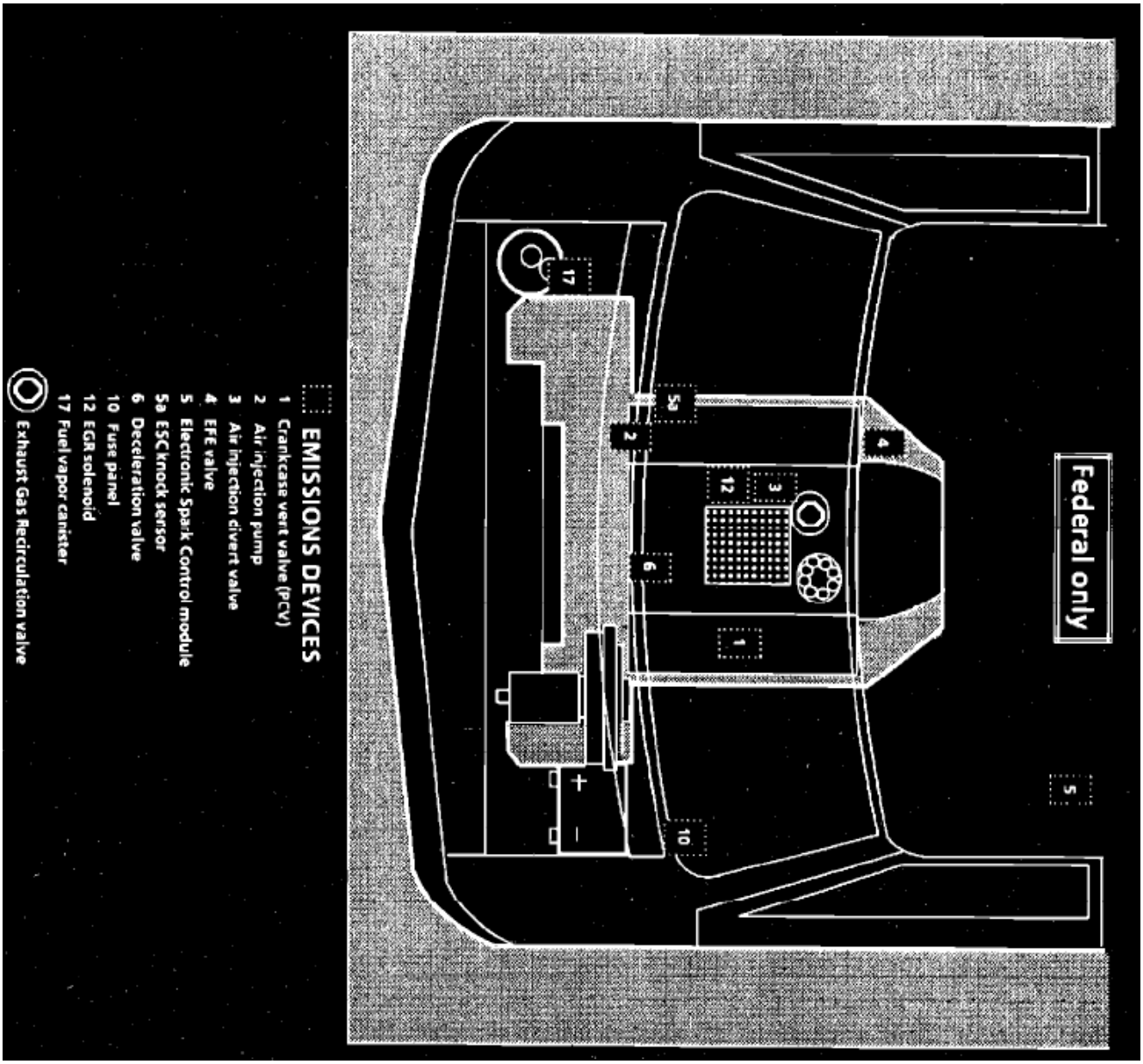


Knock Sensor: Locations Electronic Spark Control Knock Sensor

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Knock Sensor: Locations Electronic Spark Control Module

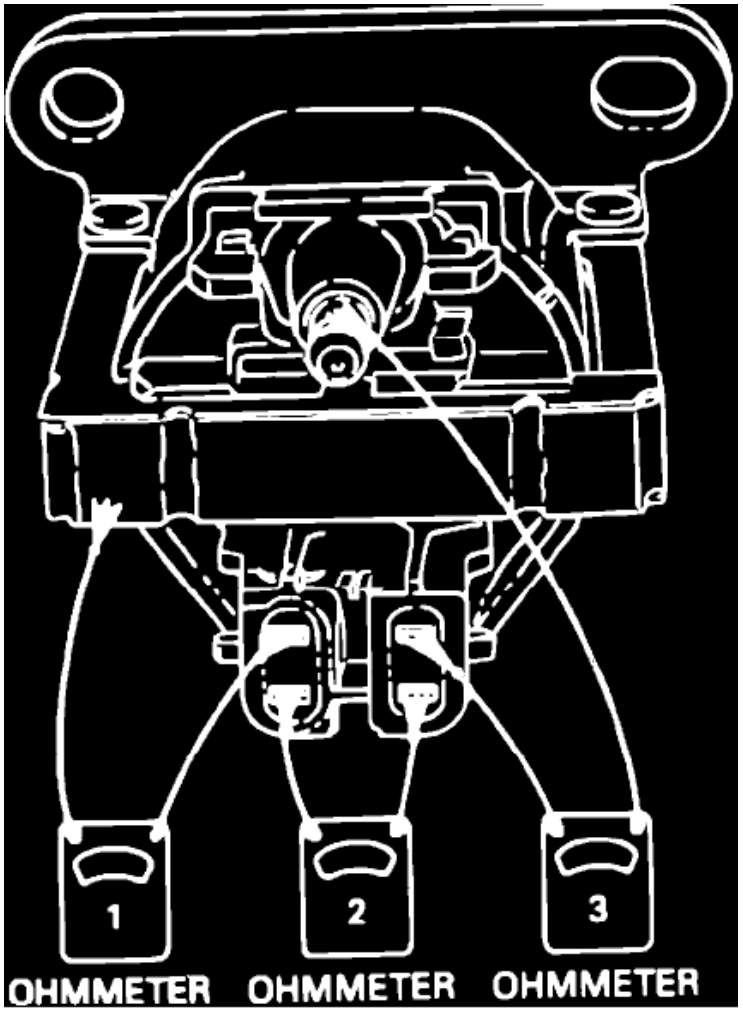
Underhood & Engine Components.

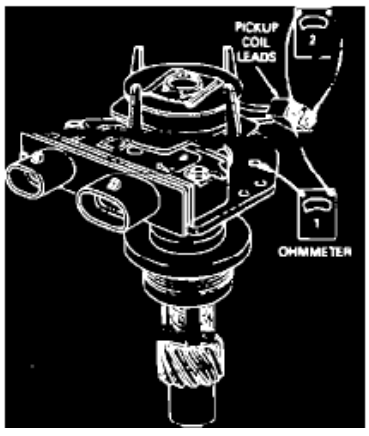
Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

Engine	Year	Resistance (ohms)	Air Gap (in./mm)
1.9L (119)	1982-85	—	.008-.016/ .2-.4
All ex. 1.9L (119)	1981-90	500-1500	—

Distributor Pickup


1
2
3
OHMMETER
OHMMETER
OHMMETER


PICKUP COIL LEADS
OHMMETER

Pick-Up Coil: Testing and Inspection

Tester J-24624 is required to test the module. If this tester is not available, and malfunction still exists after performing the following checks, replace module.

Fig. 3 Ignition coil test connections

IGNITION COIL TEST

1. Connect ohmmeter as shown in step 1, Fig. 3, and set meter on high scale. Meter should indicate very high or infinite resistance. If not, coil is defective.

2. Connect ohmmeter as shown in step 2, Fig. 3, and set meter on low scale. Meter should indicate low or no resistance. If not, coil is defective.

3. Connect ohmmeter as shown in step 3, Fig. 3, and set meter on high scale. If meter indicates infinite resistance, coil is defective.

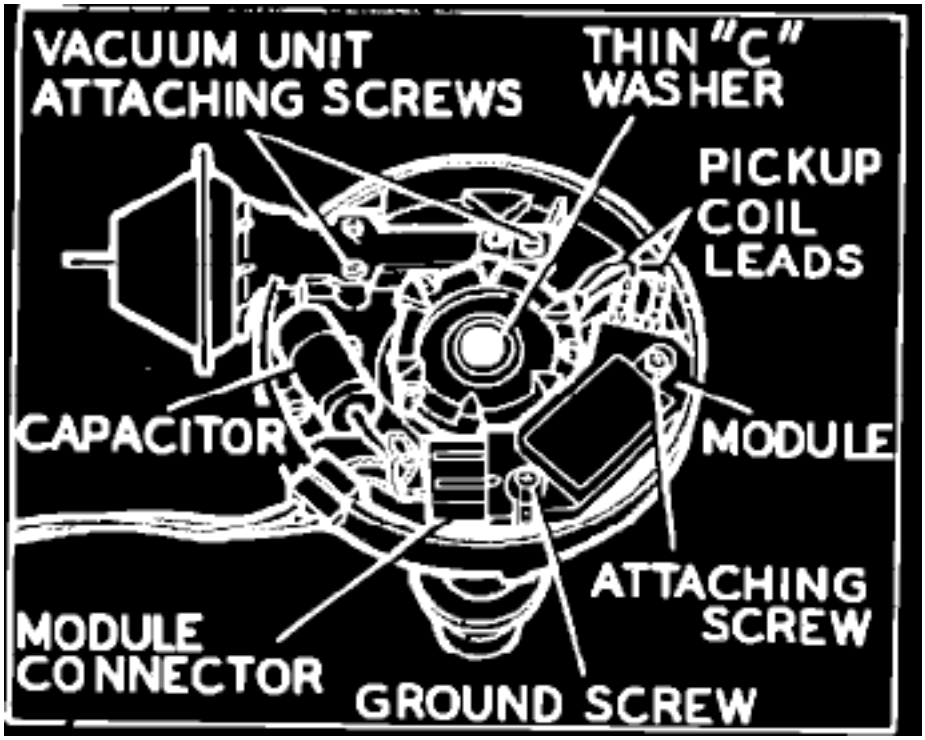
Fig. 4 Pickup coil test connections

PICKUP COIL TEST

1. Remove distributor cap and rotor, and disconnect pickup coil leads from module.

2. Connect ohmmeter as shown in step 1, Fig. 4, and flex pickup coil leads while observing meter. Meter should indicate infinite resistance at all times. If not, pickup coil is defective.

3. Connect ohmmeter as shown in step 2, Fig. 4, and flex pickup coil leads while observing meter. Meter reading should remain constant between 500 and 1500 ohms. If not, replace pickup coil.



Pick-Up Coil: Service and Repair

Fig. 13 Distributor component identification

Removal

1. With distributor removed, disconnect wires at module terminals, Fig. 13.

2. Remove roll pin from drive gear by driving out with 1/8 inch diameter drift punch.

3. Remove gear, shim and the tanged washer from distributor shaft. Remove any burrs that may have been caused by removal of pin.

4. Remove distributor shaft from housing.

5. Remove washer from upper end of distributor housing. Bushings in the housing are not serviceable.

6. Remove three screws securing pole piece to housing and remove pole piece, magnet and pickup coil.

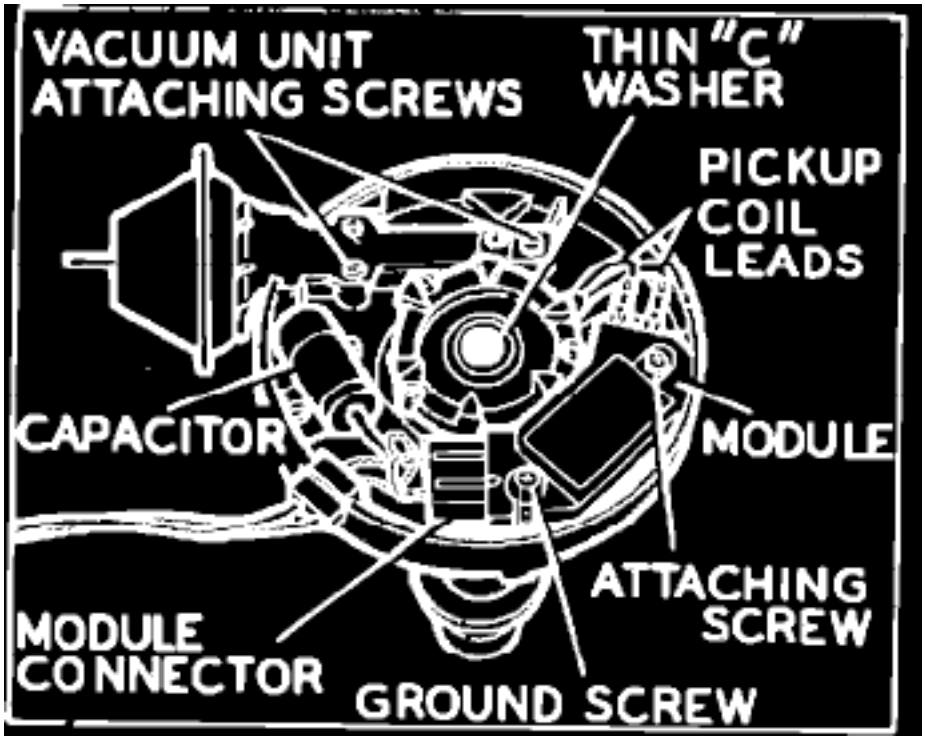
Installation

1. Install pickup coil, magnet and pole piece and loosely install three screws holding pole piece.

2. With washer installed at top of housing, install distributor shaft and rotate to check for proper clearance between pole piece teeth and timer core teeth.

3. If necessary, realign pole piece to provide adequate clearance and secure properly.

4. Install tanged washer, shim and drive gear (teeth up) to bottom of shaft. Align drive gear and install new roll pin.



Pole Piece / Reluctor Wheel: Service and Repair

Fig. 13 Distributor component identification

Removal

1. With distributor removed, disconnect wires at module terminals, Fig. 13.

2. Remove roll pin from drive gear by driving out with 1/8 inch diameter drift punch.

3. Remove gear, shim and the tanged washer from distributor shaft. Remove any burrs that may have been caused by removal of pin.

4. Remove distributor shaft from housing.

5. Remove washer from upper end of distributor housing. Bushings in the housing are not serviceable.

6. Remove three screws securing pole piece to housing and remove pole piece, magnet and pickup coil.

Installation

1. Install pickup coil, magnet and pole piece and loosely install three screws holding pole piece.

2. With washer installed at top of housing, install distributor shaft and rotate to check for proper clearance between pole piece teeth and timer core teeth.

3. If necessary, realign pole piece to provide adequate clearance and secure properly.

4. Install tanged washer, shim and drive gear (teeth up) to bottom of shaft. Align drive gear and install new roll pin.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Ignition System > Relays and Modules - Ignition System > Electronic Spark Timing <--> [Electronic Spark Control Module] > Component Information > Locations > Typical Electronic Spark System (ESC)

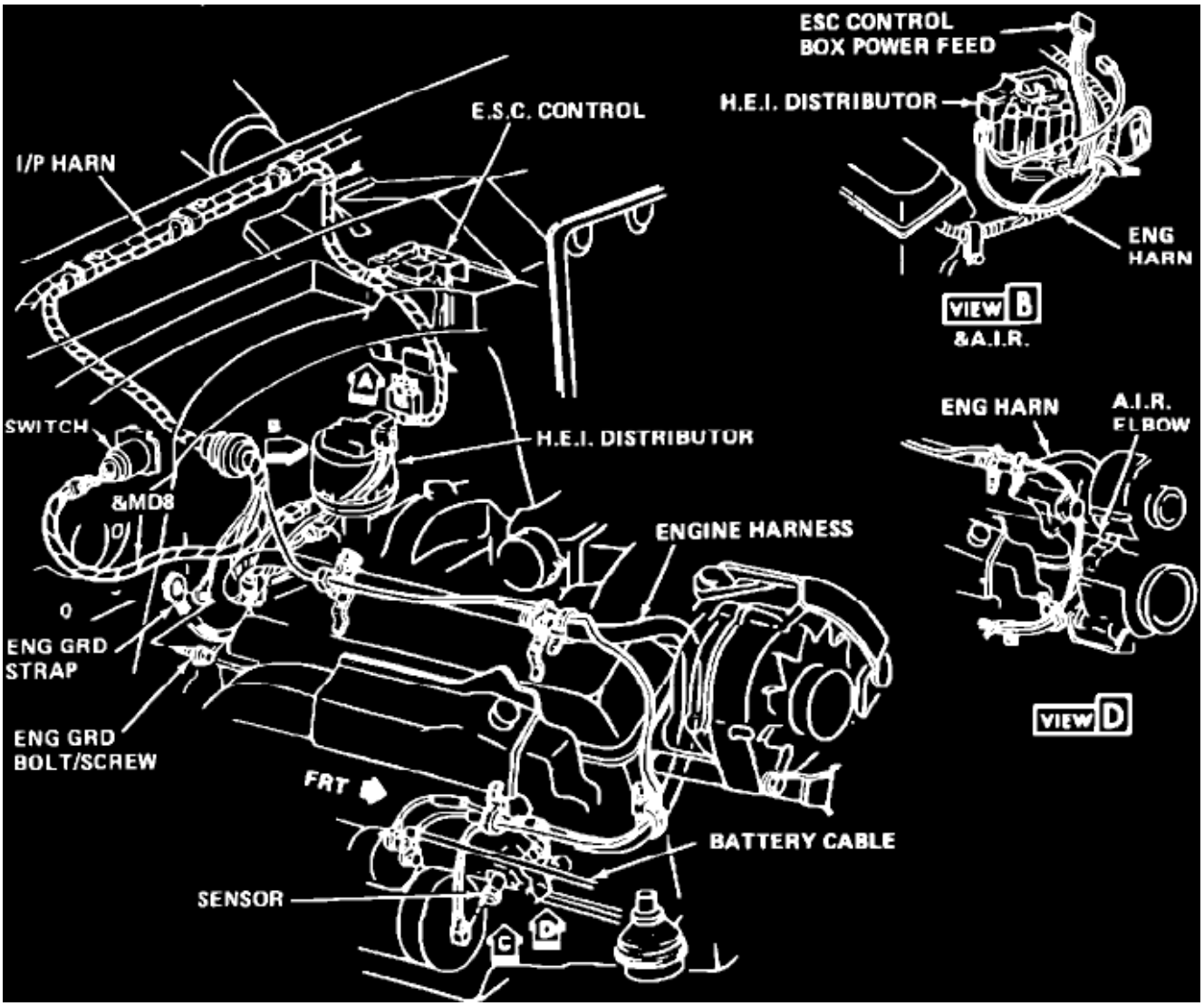


Fig. 46 Typical Electronic Spark System (ESC)

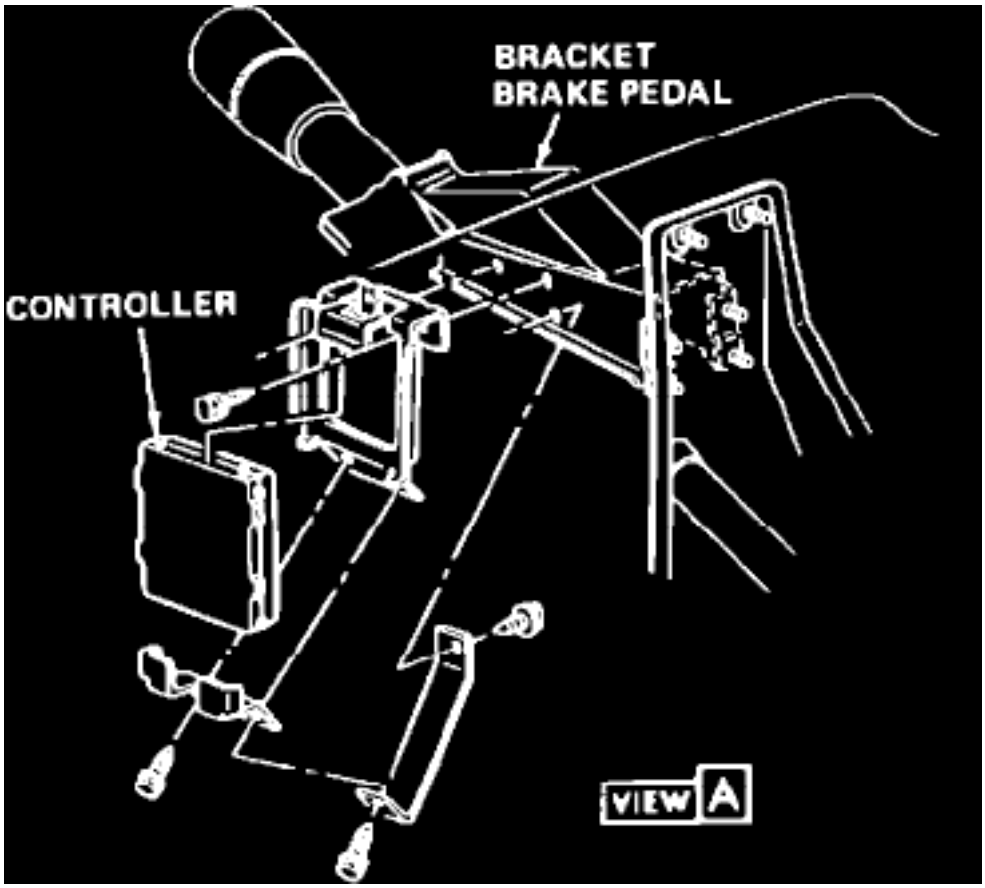
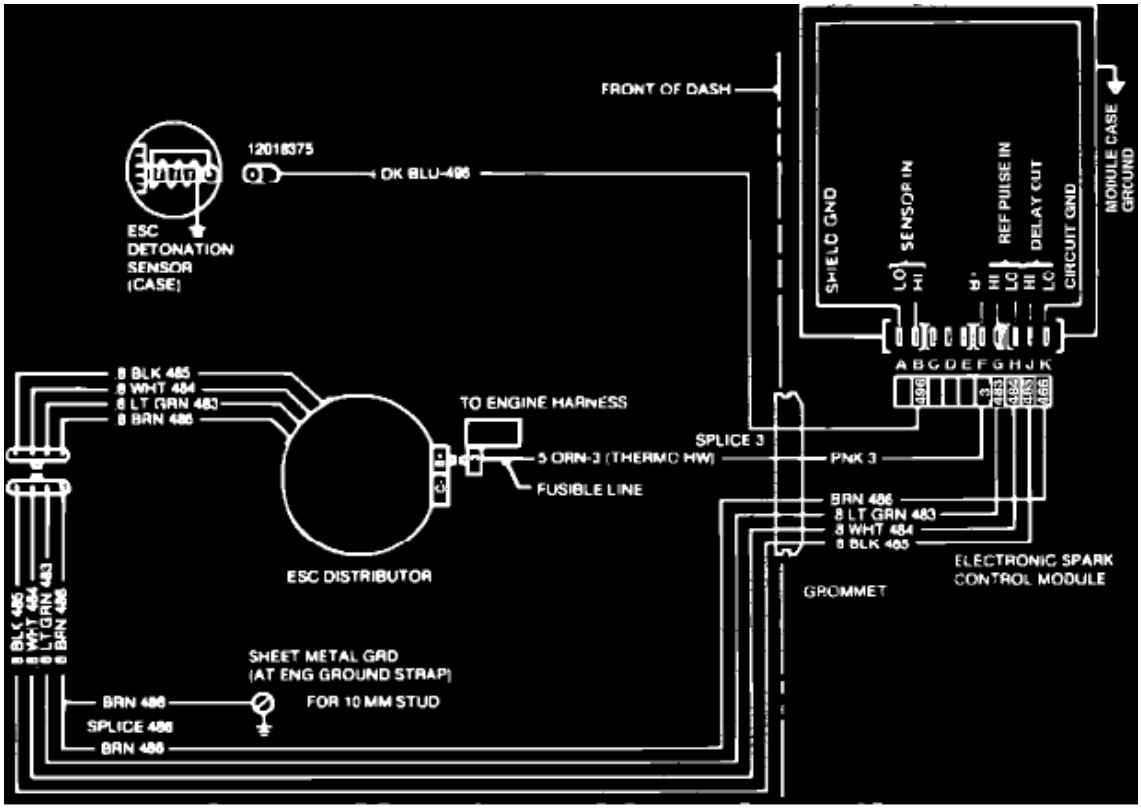
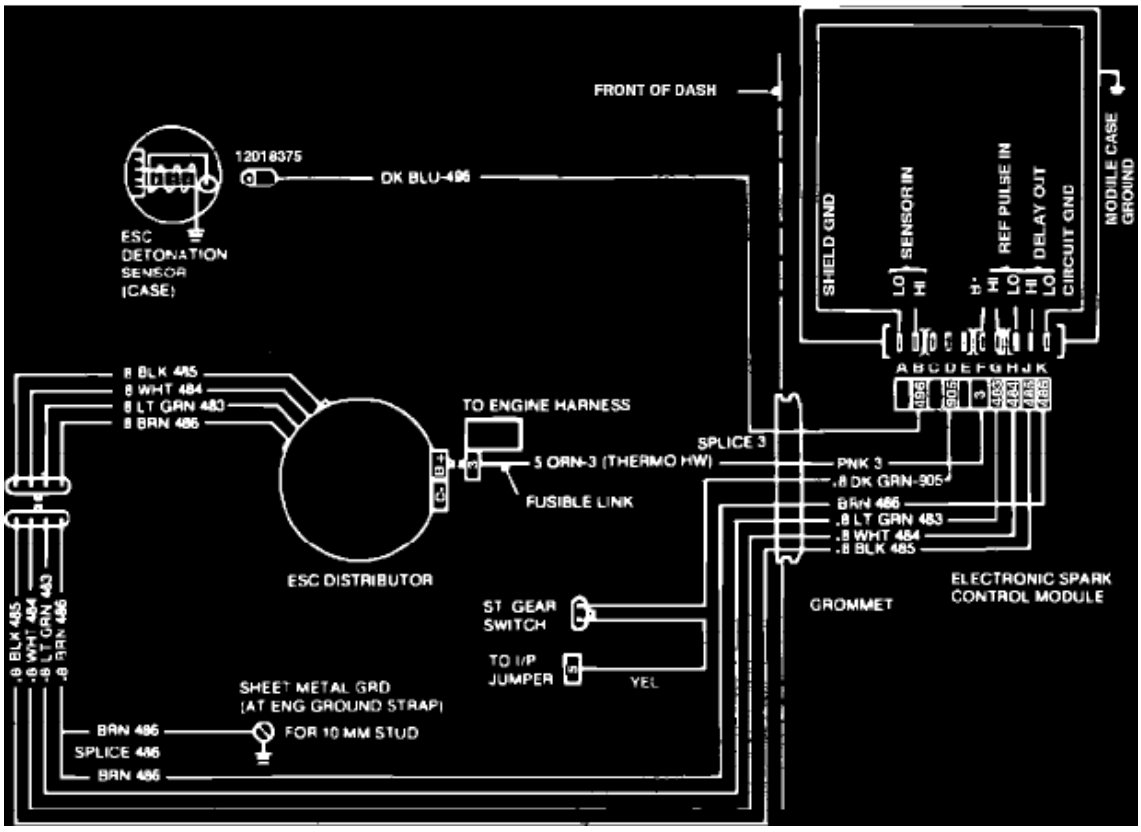


Fig. 47 Typical ESC Controller


FRONT OF DASH
12018375
DK BLU-496
ESC DETONATION SENSOR (CASE)
MODULE CASE GROUND
SHIELD GND
SENSOR IN
REF PULSE IN
DELAY OUT
CIRCUIT GND
A B C D E F G H J K
.8 BLK 485
.8 WHT 484
.8 LT GRN 483
.8 BRN 486
TO ENGINE HARNESS
SPLICE 3
5 ORN-3 (THERMO HW)
PNK 3
FUSIBLE LINE
BRN 486
.8 LT GRN 483
.8 WHT 484
.8 BLK 485
ESC DISTRIBUTOR
GROMMET
ELECTRONIC SPARK CONTROL MODULE
SHEET METAL GRD (AT ENG GROUND STRAP)
BRN 486
FOR 10 MM STUD
SPLICE 486
BRN 486


FRONT OF DASH
12018375
DK BLU-496
ESC DETONATION SENSOR (CASE)
MODULE CASE GROUND
SHIELD GND
SENSOR IN
REF PULSE IN
DELAY OUT
CIRCUIT GND
A B C D E F G H J K
.8 BLK 485
.8 WHT 484
.8 LT GRN 483
.8 BRN 486
TO ENGINE HARNESS
SPLICE 3
5 ORN-3 (THERMO HW)
PNK 3
.8 DK GRN-905
BRN 486
.8 LT GRN 483
.8 WHT 484
.8 BLK 485
FUSIBLE LINK
ESC DISTRIBUTOR
GROMMET
ELECTRONIC SPARK CONTROL MODULE
ST GEAR SWITCH
TO I/P JUMPER
YEL
SHEET METAL GRD (AT ENG GROUND STRAP)
BRN 486
FOR 10 MM STUD
SPLICE 486
BRN 486

Electronic Spark Timing: Testing and Inspection

Use the following procedures to diagnose ESC system malfunctions only. To diagnose general ignition system malfunctions, refer to ``High Energy Ignition (HEI) System Diagnosis.''

Fig. 5 ESC system wiring schematic. 1984-86 models w/manual 4 speed top loader transmission

Fig. 6 ESC system wiring schematic. 1984-86 models w/manual 3 & 4 speed side loader transmission

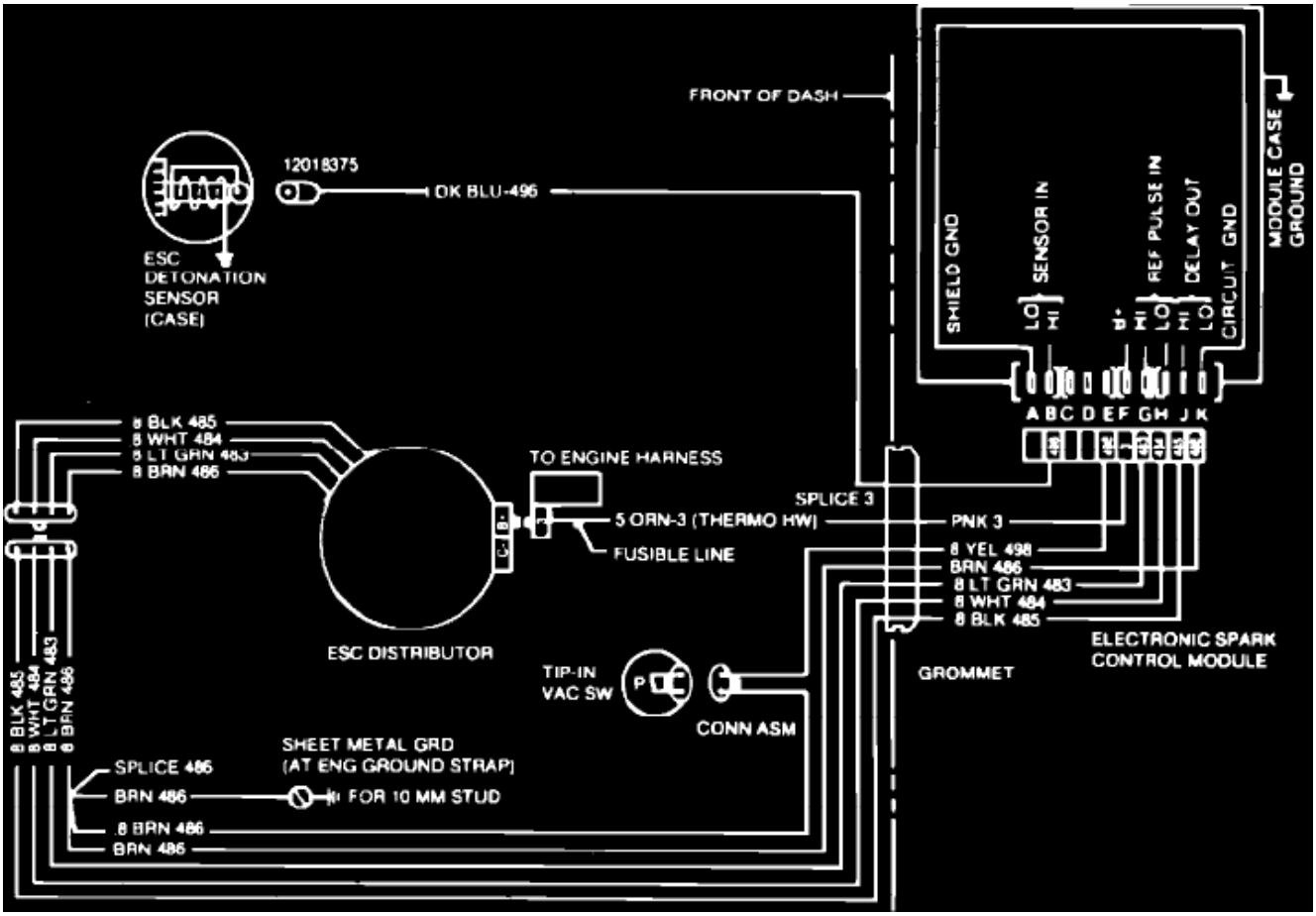


Fig. 7 ESC system wiring schematic. 1984-86 models w/auto. trans.

1984-86 MODELS

Engine Cranks But Will Not Start

1. Check for spark at at the ends of at least 2 spark plug wires using tester ST-125 or equivalent. If spark is observed, malfunction is not in ignition system.

2. If no spark is observed, disconnect 4 pin connector to distributor, connect jumper wire between pins A and C on distributor side of connector, Figs. 5, 6 and 7, and attempt to start engine. If engine starts, proceed to step 3. If engine does not start, proceed as follows:

a. Remove jumper wire and reconnect 4 pin connector to distributor. Turn on ignition and measure voltage at pins F and K of controller 10 pin

connector. If voltage is less than 11.6 volts, check feed circuit and repair as needed.

b. Set voltmeter on 2 volt scale and measure voltage between pins J and K of 10 pin connector while cranking engine. If reading is .75 volts or

greater, ESC system is satisfactory.

c. Set voltmeter on 2 volt scale and measure voltage between pins G and H of 10 pin connector while cranking engine. If reading is .20 volt or

greater, controller is defective. If reading is less than .20 volt, pole piece is defective.

3. Stop engine and remove jumper wire from distributor.

4. Connect suitable high resistance test lamp between distributor TACH terminal and ground, then turn on ignition. If test lamp lights, proceed to step 6.

5. If lamp does not light at TACH terminal, connect lamp between BAT terminal and ground and turn on ignition. If lamp does not light, repair feed circuit to ignition.

6. Crank engine with test lamp connected between distributor TACH terminal and ground. If test lamp flickers, system is satisfactory.

7. If test lamp does not flicker as engine is cranked, connect lamp between BAT terminal and pin A on distributor side of 4 pin ESC connector, then tap on coil. If coil makes a clicking noise when tapped, pole piece is defective.

8. If coil does not click, remove distributor cap an disconnect and reconnect pole piece electrical connector. If coil still does not click when tapped, ignition module is defective.

Poor Engine Performance

1. Disconnect distributor 4 pin connector, connect pins A and C on distributor side of connector with jumper wire, and road test vehicle.

2. If engine performance is still poor, cause is not in ESC system. If proper engine performance is restored by disconnecting ESC controller from distributor, remove jumper wire, reconnect 4 pin connector and proceed to next step.

3. Disconnect 10 pin connector from ESC controller, inspect terminals for proper contact, shots and opens, repair as needed, then recheck system operation.

4. If problem persists, disconnect 10 pin connector and measure resistance between pins B and K in connector. Reading should be 98-99 Kohms.

5. If resistance is not as specified, disconnect electrical connector from knock sensor and measure resistance between sensor terminal and ground. If resistance is 98-99 ohms, repair wiring between knock sensor and controller. If resistance is not 98-99 Kohms, knock sensor is defective.

6. Reconnect 10 pin connector to controller and measure voltage between pins F and K with ignition on. If voltage reading is less than 11.6 volts repair feed circuit as needed.

7. Set voltmeter on 20 volt AC scale and measure voltage between connector pins H and K with ignition on. If reading is less than .20 volt, inspect system wiring and repair as needed. If reading is greater than .20 volt, ensure all connectors are properly seated, then road test vehicle. If problem persists, replace ESC controller.

Engine Detonation

1. Inspect connector and wiring to knock sensor and repair as needed.

2. Connect suitable spark advance tester to engine, run engine until it reaches normal operating temperature and set engine to run at a minimum of 1200 RPM, then observe ignition timing while tapping on exhaust manifold. If ignition timing retards when manifold is tapped, ESC system is operating properly.

3. Stop engine, disconnect 10 pin connector from ESC controller and measure resistance between pins B and K of connector. If resistance is not 98-99 ohms, proceed to step 5.

4. Measure resistance between pins H and K in connector. If resistance is 14-16 ohms, replace controller. If resistance is not 14-16 ohms, repair wiring to controller.

5. Disconnect electrical connector from knock sensor and measure voltage at sensor terminal with engine running at 2000 RPM. If reading is not .08 volt or more, knock sensor is defective.

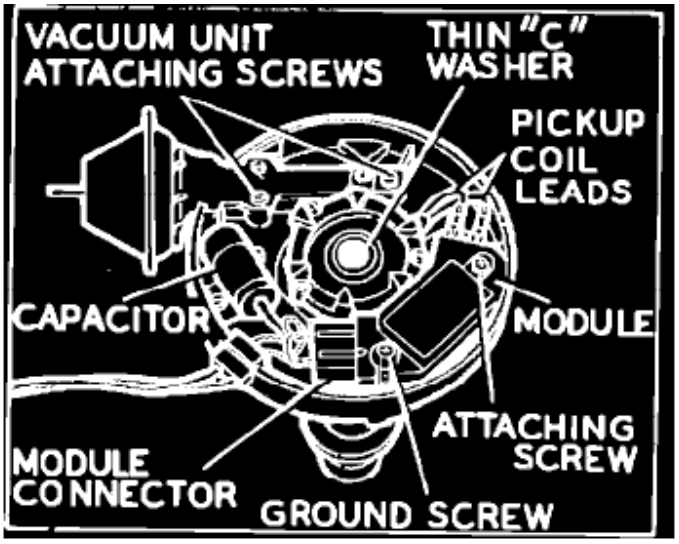
6. Stop engine. If knock sensor voltage output is satisfactory, check wiring between knock sensor and terminal B of controller and between controller terminal K and ground and repair as needed.

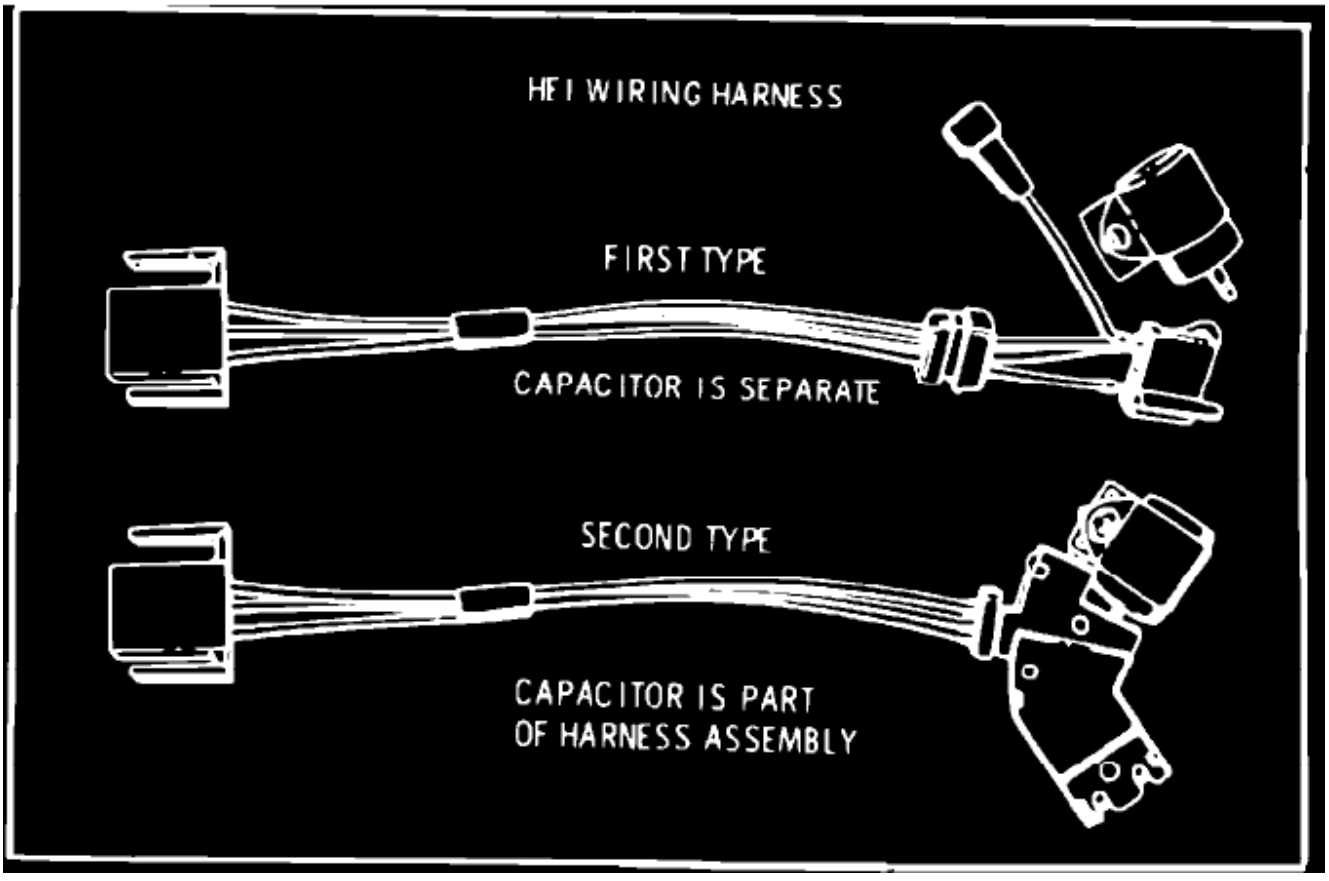
Ignition Control Module: Testing and Inspection

If the vehicle cranks for at least 5 seconds and the Engine Control Module doesn't see a referance signal, some Models will set a code, 42 (Hard) or 12 (Soft). If your vehicle has one of these codes, begin with the Diagnostic System Check in Computers and Controls, then proceed to the Trouble Code Chart (Yes, some vehicles have a DTC Chart for Code 12).

If the vehicle does not set a code, begin with the Diagnostic System Check, and it will send you to a Diagnostic Chart that checks for your particular condition.

These types of tests are found under Computers and Control Systems. See: Computers and Control Systems/Testing and Inspection





Ignition Control Module: Service and Repair

Fig. 13 Distributor component identification

Fig. 14 Ignition module harness identification

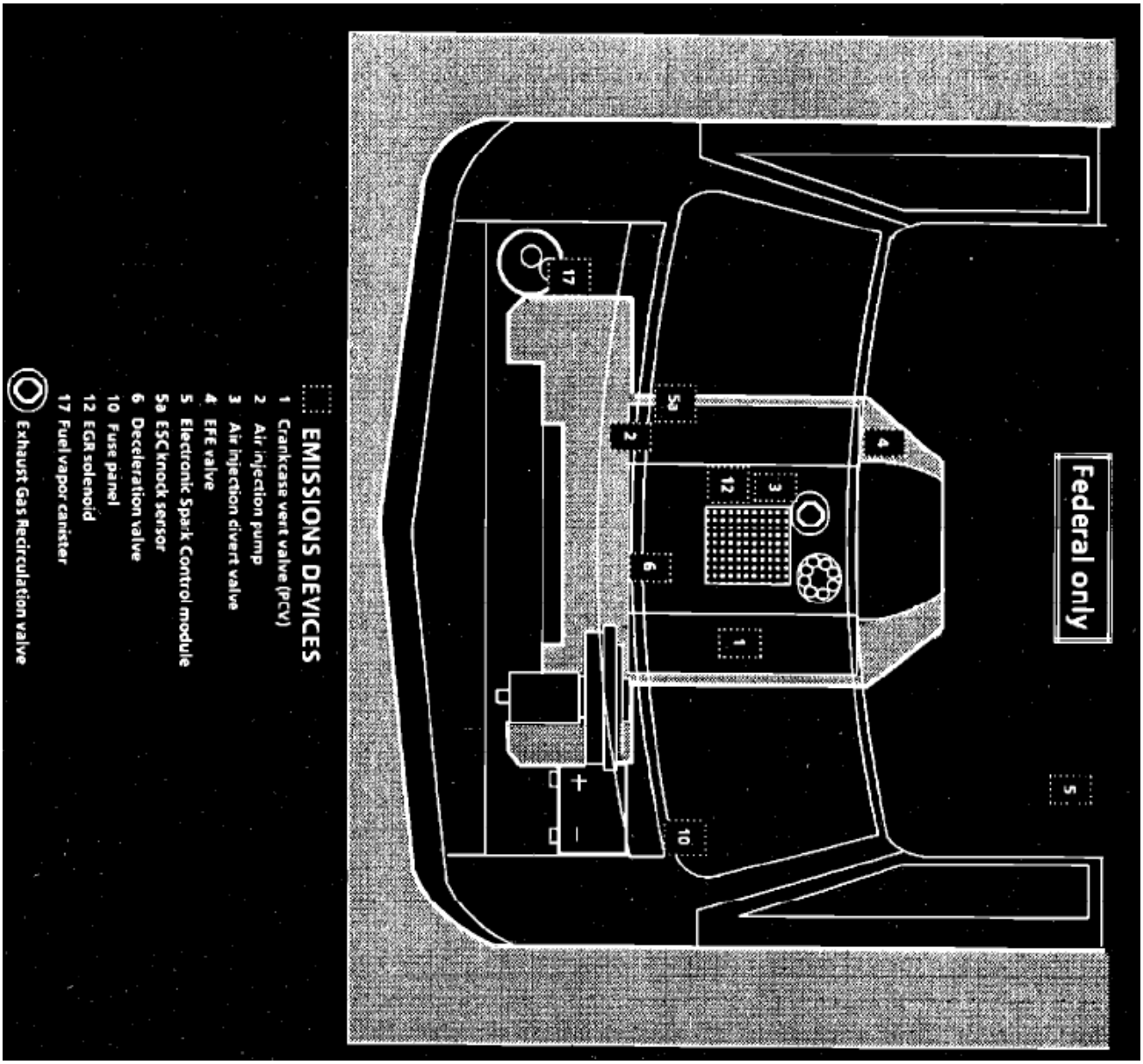
1. Disconnect wiring harness connector at side of distributor cap and remove distributor cap.

2. Remove rotor and disconnect wires from module terminals.

3. Remove two mounting screws and remove module, Fig. 13. Two types of H.E.I. wiring harness are used, Fig. 14. The second type is a wiring harness, connector and capacitor which is serviced as an assembly.

4. Reverse procedure to install. Prior to installation, coat bottom of new module with dielectric grease (furnished with new module) to aid in heat transfer into distributor housing. Failure to apply grease will cause excessive heat at module and premature module failure.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Ignition System > Sensors and Switches - Ignition System > Knock Sensor > Component Information > Locations > Electronic Spark Control Knock Sensor

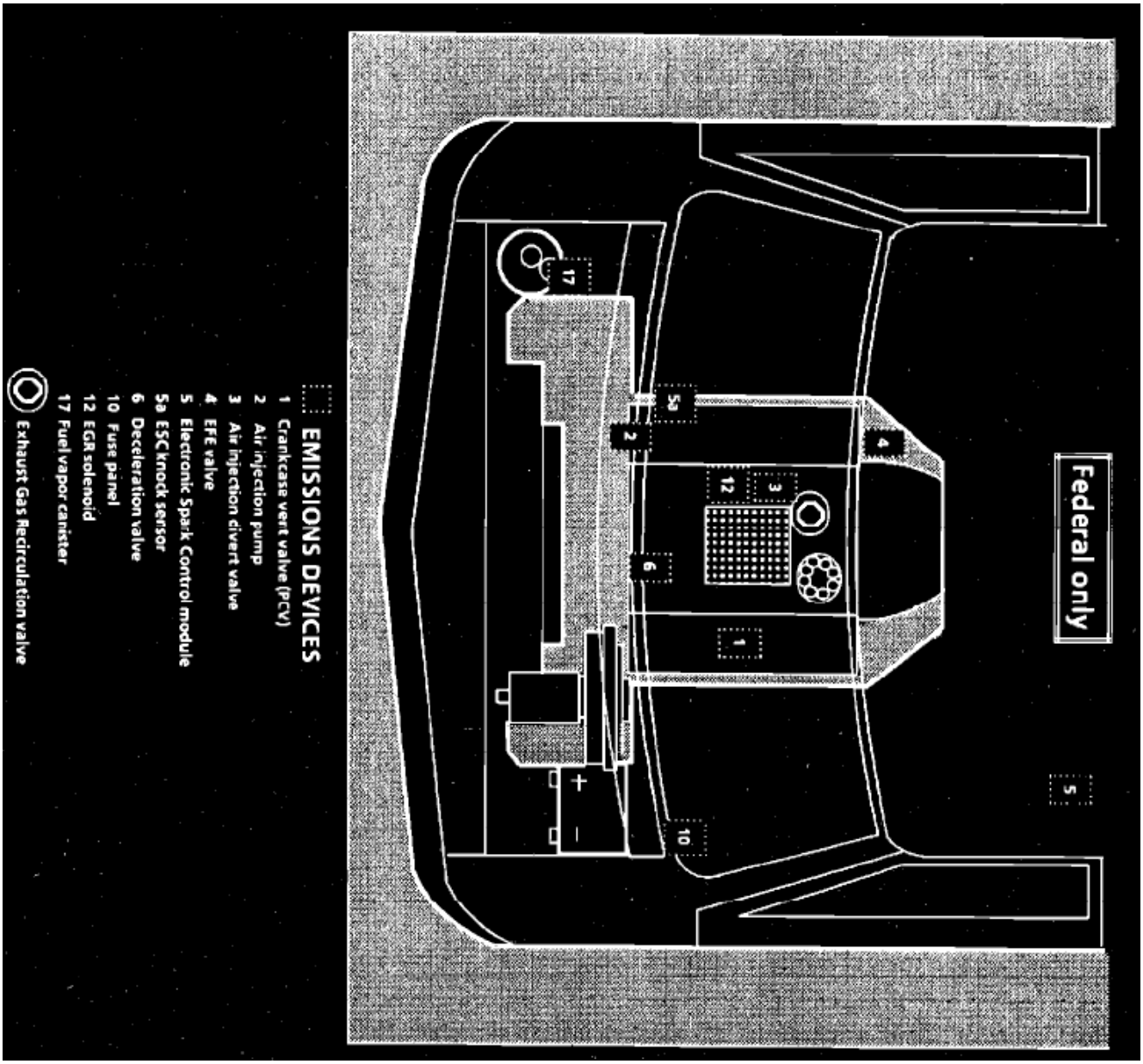


Knock Sensor: Locations Electronic Spark Control Knock Sensor

Underhood & Engine Components.

RH Side Of Engine

Applicable to: 1985 G Series w/5.0L & 5.7L Except California



Knock Sensor: Locations Electronic Spark Control Module

Underhood & Engine Components.

Under Driver's Seat

Applicable to: 1985 G Series w/5.0L & 5.7L Except California

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Ignition System > Spark Plug > Component Information > Technical Service Bulletins > Customer Interest for Spark Plug: > 86B77 > Apr > 86 > Engine - Spark Knock, Poor Performance

Spark Plug: Customer Interest Engine - Spark Knock, Poor Performance

NUMBER: 86-B-77

GROUP: 6D - Engine Electrical

DATE: April, 1986

SUBJECT: SPARK KNOCK (PREIGNITION)

MODELS: 1984-85 C, K, G TRUCKS EQUIPPED WITH THE LE9 5.0L, LF3 5.0L, OR LS9 5.7L ENGINE AND ELECTRIC SPARK CONTROL (ESC) FEDERAL EMISSIONS AND ELECTRONIC SPARK TIMING (EST) CALIFORNIA EMISSIONS.

THIS BULLETIN CANCELS AND SUPERSEDES 86-B-21 (DECEMBER, 1985) ALL COPIES OF WHICH SHOULD BE DESTROYED.

Some 1984-85 vehicles equipped with the LE9 5.0L (VIN Code H), LF3 5.0L (VIN Code F), or LS9 5.7L (VIN Code L) engine may experience detonation (preignition) or poor performance when operating in a loaded condition or pulling a grade. As a result of the preignition, the ESC (Federal) or EST (California) retards the spark timing, and a noticeable reduction in performance may occur. In the event the preignition condition is not corrected by the ESC/EST spark retard, continued operation under these conditions could result in internal engine damage. To reduce the possibility of this occurrence, the spark plugs should be changed to a colder heat range. When these conditions exist, the original equipment (R44TS) spark plugs should be replaced with R43CTS (P/N 5613810). The correct spark plug gap is .045". Starting with 1986 vehicles, the LE9, LF3, LS9, and LT9 engines are built with the R43CTS spark plugs.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Ignition System > Spark Plug > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Spark Plug: > 86B77 > Apr > 86 > Engine - Spark Knock, Poor Performance

Spark Plug: All Technical Service Bulletins Engine - Spark Knock, Poor Performance

NUMBER: 86-B-77

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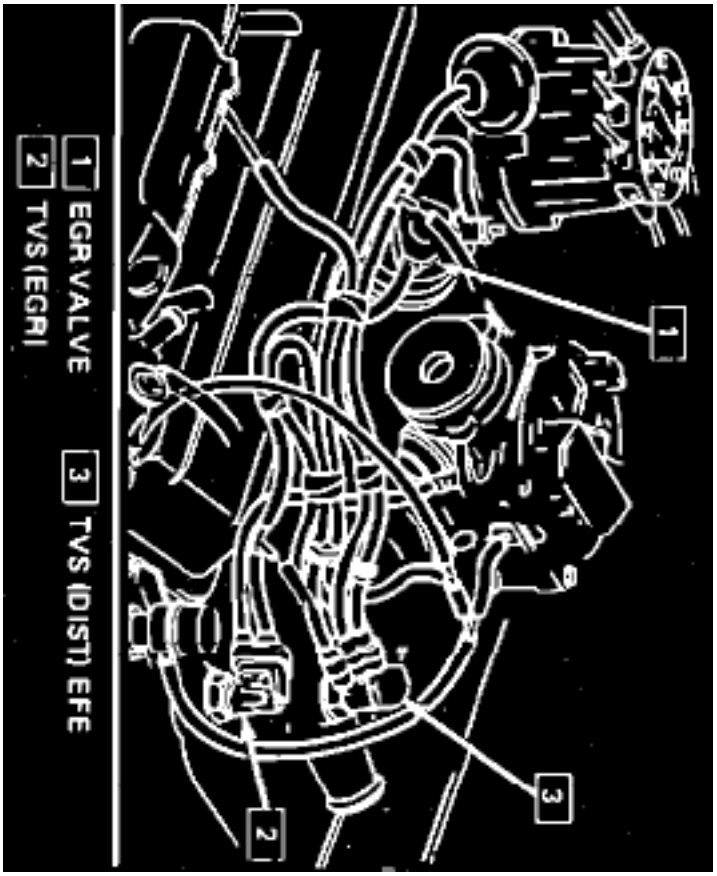
Spark Plug: Specifications

Plug Tightening Torque 22 ft.lb

Engine	Year	Gap (inches)	Gap (mm)	Torque (ft-lb)
4-cyl. 1.9L (119)	1982-86	.044	1.1	—
4-cyl. 2.0L (122)	1983-84	.035	.89	7-15
4-cyl. 2.5L (151)	1985-90	.060	1.52	7-15
V-6 2.8L, 3.8L	1982-90	.045	1.14	7-15
V-6 4.3L	1985-90	.035	.89	7-15
6-cyl.	1981-89	.035	.89	17-27
8-cyl.	1981-86	.045	1.14	17-27
8-cyl.: Light Duty	1987-88	.035	.89	22
Heavy Duty	1987-88	.045	1.14	22
8-cyl.	1989-90	.035	.89	22

SPARK PLUGS

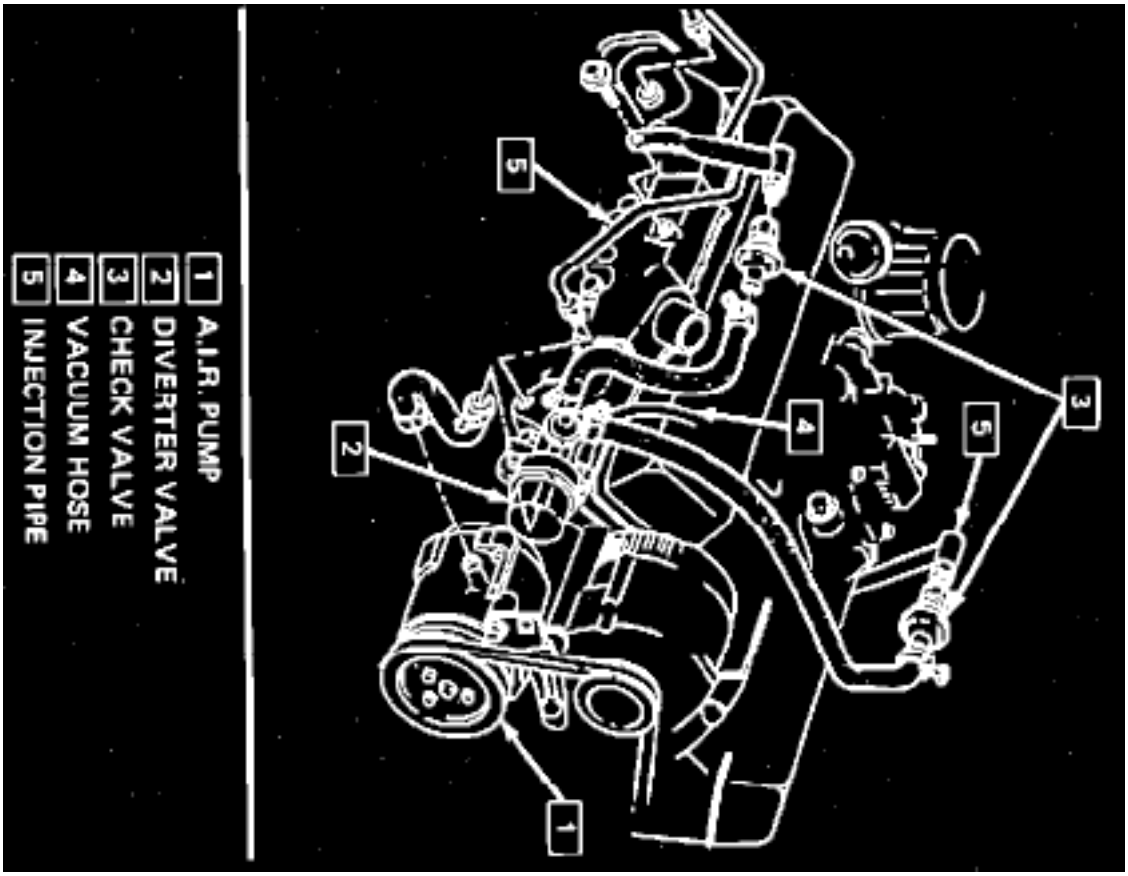


Thermal Vacuum Valve: Locations

Top Of Engine.

Front Top Of Engine

Applicable to: 1985 5.0L & 5.7L

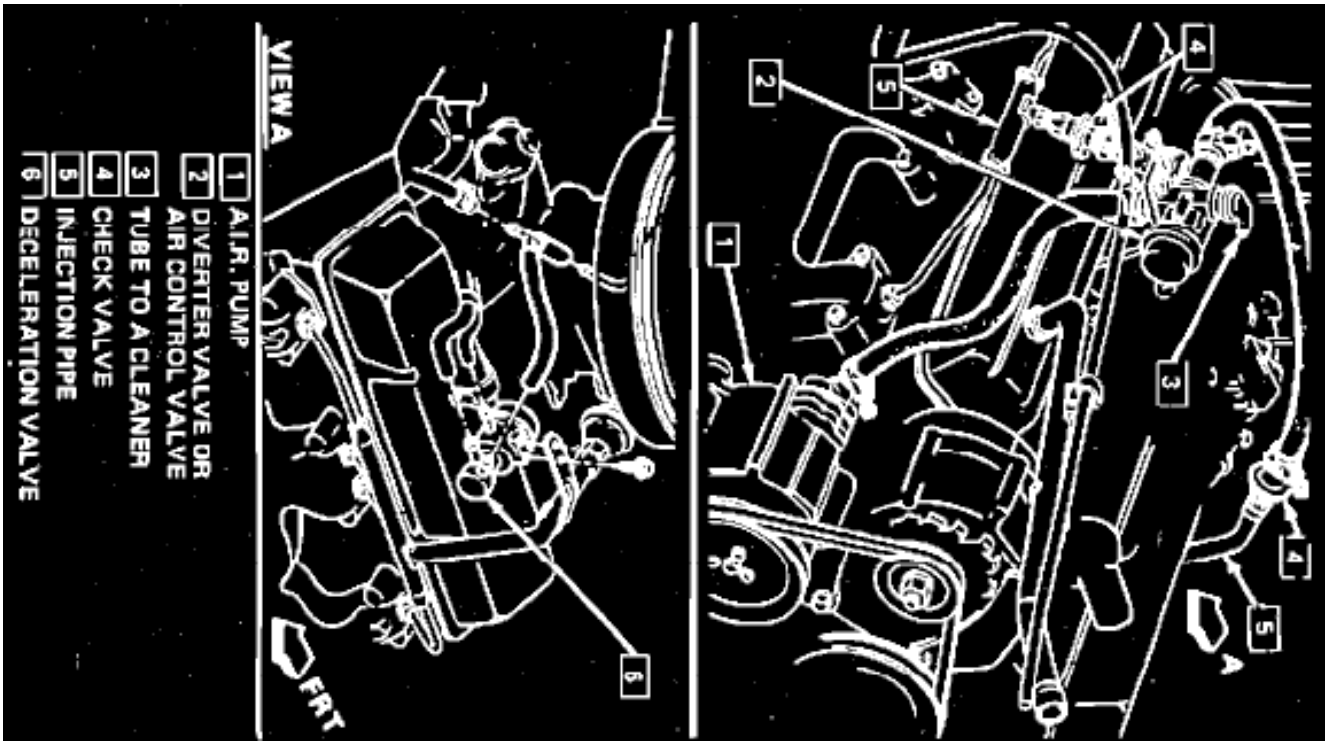


Vacuum Restrictor: Locations Heavy Duty Emissions

Top Of Engine.

On Injection Pipes

Applicable to: 1985 V8 & Heavy Duty Emissions



Vacuum Restrictor: Locations Light Duty Emissions

LH & RH Sides Of Engine.

On Injection Tubes

Applicable to: 1985 V8 & Light Duty Emissions

Shift Solenoid: Description and Operation Upshift Solenoid

1-2 Shift Valve

Controls the speed at which the 1-2 and 2-1 shifts occur.

2-3 Shift Valve

Controls speeds at which 2-3 and 3-2 shifts occur.

Stator Valve

Used only on transmissions having the variable pitch stator, this valve shifts when line oil is exhausted at end of valve when stator control solenoid is energized. This exhausts oil from the variable pitch stator piston and changes from the low to the high angle. When the stator solenoid is not energized, converter oil is directed to the stator piston and low angle is obtained.

Shift Solenoid: Description and Operation Shift Solenoid

DESCRIPTION

The detent solenoid is activated by an electric switch at the carburetor. When the throttle is opened sufficiently to close this switch, the solenoid in the transmission is activated, causing a downshift at speeds below 70 mph. it lower speeds, downshifts will occur at lesser throttle openings without the use of the electric switch.

1-2 Detent Valve

Senses regulated modulator pressure tending to hold 1-2 shift valve downshifted and provides an area for detent pressure for detent 2-1 shifts.

Detent Valve

Shifts when oil line is exhausted at end of valve when detent solenoid is energized. This directs detent oil to the 1-2 accumulator valve, 1-2 regulator and 2-3 modulator valves, 3-2 valve and the vacuum modulator valve.

Detent Regulator Valve

When the detent valve shifts, the detent regulator is free to allow drive oil to enter the detent passage and thus becomes regulated at 70 psi. Detent pressure will also flow into the mod lator passage which flows to the shift valves. Low gear oil moves the detent regulator open to drive oil, allowing drive oil to enter modulator and detent passages.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Transmission Control Systems > Lamps and Indicators - Transmission and Drivetrain > Lamps and Indicators - A/T > Maintenance Indicator - A/T > Component Information > Technical Service Bulletins > A/T Fluid Level Indicator - Available

Maintenance Indicator - A/T: Technical Service Bulletins A/T Fluid Level Indicator - Available

Number: 90-406-7A

Section: 7A

Date: March 1991

Corporate Bulletin No.: 067107

Subject: AVAILABILITY/SERVICING OF NEW TRANSMISSION FLUID LEVEL INDICATOR

Model and Year: 1982-90 C/K TRUCKS, 1987-90 R/V TRUCKS, 1983-90 G VANS WITH 3L80 OR 4L60 AUTOMATIC TRANSMISSION

A new transmission fluid level indicator featuring a seal at the transmission fill tube inlet end is available. This indicator, which is installed on all 1991 C/K, R/V and G models, may be installed on previous models listed below.

SERVICE PROCEDURE:

When installing a new transmission fluid level indicator, replacement of the transmission fluid fill tube is not necessary.

SERVICE PARTS INFORMATION

Part Number Model Description

15659455 1982-90 C/K All & Transmission fluid

3L80 or 4L60 level indicator

15659455 1987-90 RN All & Transmission fluid

3L80 or 4L60 level indicator

15677051 1987-90 G All w/(4.3Z, 5.0H, 5.7K) Transmission fluid

& 4L60 level indicator

15677052 1987-90 G2 (6.2C) & 4L60 Transmission fluid

1983-86 G All & 4L60 level indicator

15677055 1987-90 G3 (6.2J) & 3L80 Transmission fluid

1987-88 G3 (5.7M) & 3L80 level indicator

1984-86 G All & 3L80 1983 G3 & 3L80

15677056 1987-90 G All w/(4.3Z, 5.0H, 5.7K) Transmission fluid

& 3L80 level indicator

15677057 1988-90 G3 (7.4N) & 3L80 Transmission fluid level indicator

Parts are currently available from GMSPO.

WARRANTY INFORMATION

For vehicles repaired under warranty use:

Labor Operation: K6130

Use applicable Labor Time Guide for labor hours.

Fluid Pressure Sensor/Switch: Customer Interest A/T - Buzzing Noise at Idle

Number: 93-29-7A Section: 7A Date: OCT. 1992 Corporate Bulletin No.: 277142 ASE No.: A2

Subject: BUZZING NOISE AT IDLE

Model and Year: 1982-93 CAPRICE, CAMARO AND CORVETTE 1982-93 C/K, R/V, S/T, M/L AND G TRUCKS WTIH 4L60 AUTOMATIC TRANSMISSION

TRANSMISSION APPLICATIONS: 1982-1993 HYDRA-MATIC 4L60 (MD8)

TRANSMISSION MODELS: All

SUBJECT: Pressure Regulator Valve Buzz

VEHICLE APPLICATIONS: B, D, F, Y - Cars C/K, R/V, S/T Trucks G, M, L - Vans

CONDITION:

Some 1982-1993 vehicles equipped with a HYDRA-MATIC 4L60 transmission may have a buzzing noise coming from the transmission when the vehicle is at idle. The buzzing noise may be noticed more when the vehicle is in reverse at idle.

CAUSE:

The buzzing noise may be a result of pressure regulator valve oscillating due to oil pressure instability at lower idle RPM.

CORRECTION:

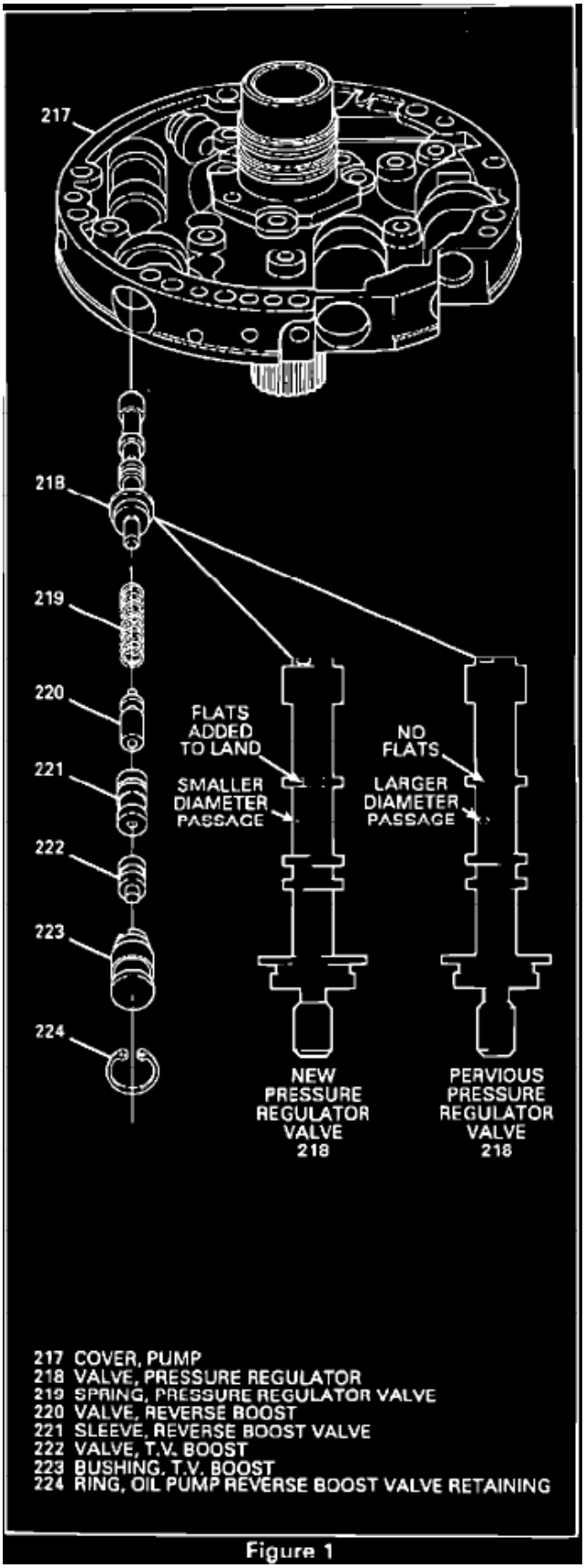


Figure 1

A new pressure regulator valve (III. 218) has been made which will improve the oil pressure stability at lower RPM.

SERVICE PARTS INFORMATION:

Description Part Number

Valve, Pressure Regulator (III. 218) 8684048

Part numbers are for Reference Only. Check with your Parts Department for latest information.

Labor Operation No.: K6550 Valve, Pressure Regulator-R&R; or Replace

Use the appropriate labor time in the labor time guide.

Parts are currently available from GMSPO.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Transmission Control Systems > Sensors and Switches - Transmission and Drivetrain > Sensors and Switches - A/T > Fluid Pressure Sensor/Switch, A/T > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Fluid Pressure Sensor/Switch: > 93297A > Oct > 92 > A/T - Buzzing Noise at Idle

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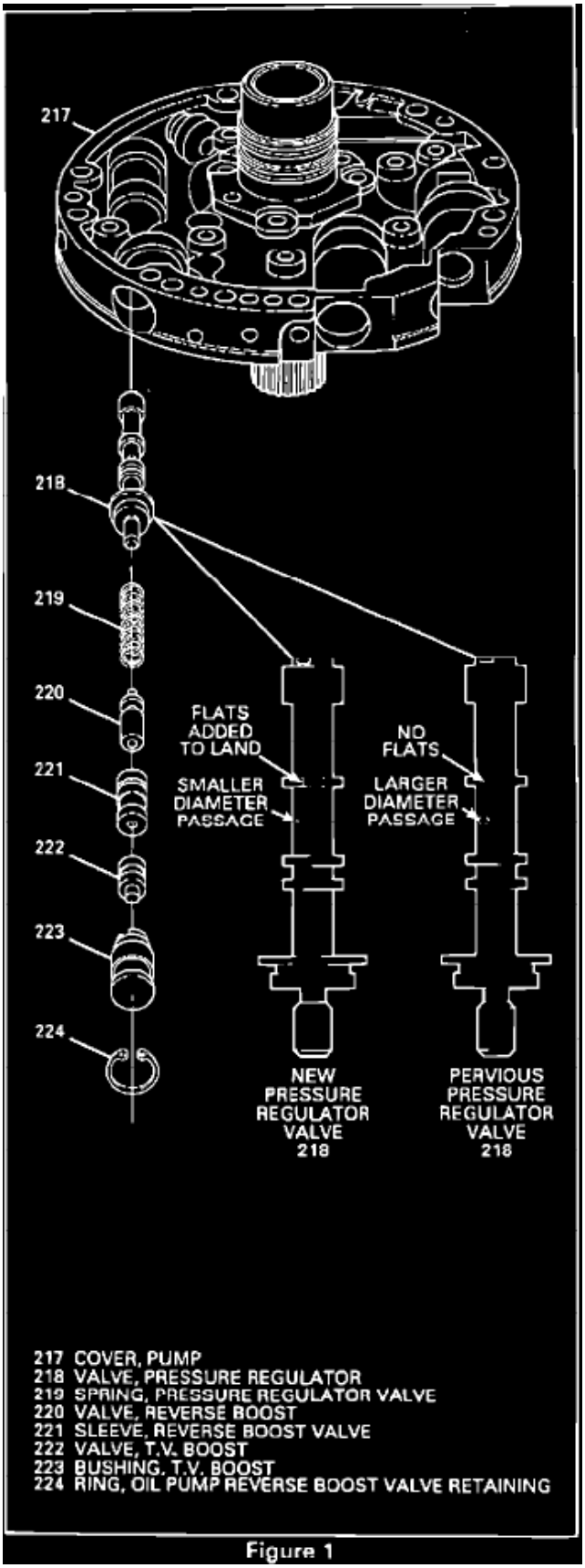

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Fluid Pressure Sensor/Switch: Description and Operation

Description

A pressure sensitive switch is screwed through the rear face of the valve body assembly into the direct clutch oil passage. This switch is closed (grounded) in all but direct drive and reverse, since there is no oil pressure in this passage in Neutral, First or Second gear. The pressure switch is connected by a wire to a transmission connector and hence through an engine solenoid valve to the distributor and engine thermoswitch. When this circuit is grounded (switch closed), spark advance is retarded.

When the transmission shifts to high gear (or reverse), oil pressure in the direct clutch passage will open the switch and circuit so that the transmission will no longer affect the vacuum advance of the distributor.

Line Pressure Regulator

Regulates line pressure according to pump speed and engine torque.

Shift Interlock Switch: Customer Interest Backup Lamps/Tailgate Window Release - Inoperative

Number: 91-459-8A

Section: 8A

Date: DEC. 1991

Corporate Bulletin No.: 168104

ASE No.: A6

Subject: BACKUP LAMPS OR TAILGATE WINDOW RELEASE INOPERATIVE

Model and Year: 1980-91 ALL LIGHT DUTY TRUCKS (EXCEPT GEO)

Owners of some 1980-1991 C/K, 1982-1991 G, 1985-1991 M/L, 1984-1991 P2,P3, 1987-1991 R/V, 1983- 1991 ST (including LLV) with automatic transmissions may comment on a condition of inoperative back-up lamps or inoperative tailgate window release. This condition occurs when the vehicle's gear shift lever is placed in the "reverse" position, but the back-up lamps do not illuminate. In addition, on the S/T utility vehicles, the electric tailgate window release does not release when the transmission gear shift lever is placed in the "park" or "neutral" position and the endgate window release button is depressed. The park/neutral and back-up lamp switch comes out of adjustment which does not allow for the contact points to remain engaged.

To correct these conditions, the contact carrier on the park/neutral and back-up lamp switch has been modified to increase switch carrier travel.

SERVICE PROCEDURE:

1. Disconnect the battery ground cable from the battery.

2. Disconnect the switch assembly harness.

3. Place the gear selector in neutral.

4. Squeeze the tangs on the switch together and remove the switch assembly.

5. Install the new switch assembly (P/N 15679680) by:

-aligning the actuator with the cutout in the steering column jacket. -inserting the tangs into the rectangular holes and pushing

down on the switch assembly.

6. Adjust the switch by moving the gear selector to park.

7. Connect the switch assembly harness.

8. Connect the negative battery cable.

9. Check for proper switch operation. Readjust the switch as necessary.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Powertrain Management > Transmission Control Systems > Sensors and Switches - Transmission and Drivetrain > Sensors and Switches - A/T > Shift Interlock Switch > Component Information > Technical Service Bulletins > All Technical Service Bulletins for Shift Interlock Switch: > 914598A > Dec > 91 > Backup Lamps/Tailgate Window Release - Inoperative

Shift Interlock Switch: All Technical Service Bulletins Backup Lamps/Tailgate Window Release - Inoperative

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PROM - Programmable Read Only Memory: Technical Service Bulletins Engine Controls - ECM May Contain Wrong PROM

Number: 88-42

Section: 6E

Date: Sept., 1987

Subject: SERVICE REPLACEMENT ELECTRONIC MODULES (ECM) WITH PROM INSTALLED

Model and Year: 1981-88 ALL MODELS TO:

ALL CHEVROLET DEALERS

It has been brought to our attention that some service replacement electronic control modules (ECM's) have contained a PROM. A PROM should not have been included in a replacement ECM as it may not be the correct PROM for the vehicle.

When this situation is encountered, the PROM should be removed from the replacement ECM and the PROM from the vehicle should be installed.

PROM - Programmable Read Only Memory: Service Precautions

A PROM is a sensitive electronic part and must be handled with care. If the connector terminals (pins) on the bottom of the PROM are exposed, avoid touching them. Pins can be broken easily, and the PROM can be damaged by static electric discharge. Follow these guidelines when replacing a PROM:

^ Disconnect the battery ground cable before removing a PROM. Reconnect the cable after the new PROM is installed.

^ DO NOT try to remove a PROM from its plastic PROM carrier.

^ Note the direction in which the original PROM and its carrier were installed in the ECM, and install the replacement PROM in the same direction. Most PROM's are marked with a notch at one end for orientation. Many PROM's can be installed in a reversed direction, which will destroy the PROM when power is applied.

CAUTION: A PROM can be damaged by static electric discharge. Avoid damage as follows:

^ DO NOT remove a PROM from its packing material until you are ready to install it. DO NOT hold a PROM by its pins.

^ Before entering a vehicle to remove or replace a PROM, touch an exposed metal part of the vehicle to discharge any static charge from your body or use anti-static wrist straps.

^ Avoid sliding across upholstery or carpeting when removing or installing a PROM. If this is not possible, touch an exposed metal part of the vehicle with your free hand before removing a PROM or installing a new one in its socket in the ECM.

^ When available, use an antistatic grounding strap attached to your wrist and clipped to a metal part of the vehicle body to prevent static charges from accumulating. Antistatic, conductive floormats are also available.

^ For some vehicles, it may be desirable to remove the ECM when replacing the PROM.

^ NOTE: See POWERTRAIN MANAGEMENT / SERVICE PRECAUTIONS / VEHICLE DAMAGE WARNINGS / ELECTRICAL PRECAUTIONS

PROM - Programmable Read Only Memory: Application and ID Introducing the GM PROM Cross Reference Index

This PROM cross reference index provides tables that let you use a PROM identification (ID) code to identify the PROM installed in the engine control module (ECM) on most GM vehicles. The code can be either - or both - the internal "scan ID" code or the external PROM code. From the PROM identification, you can find the part number of the PROM and trace the PROM history to determine if any revised PROM's have been issued to supersede the one in the vehicle.

The PROM history for a specific vehicle lists a succession of superseding PROM's ending with the most recent PROM released as a service part for the vehicle. PROM's that were released as service parts and explained in a technical service bulletin (TSB) are listed with a description of why the PROM was issued. In most cases, the applicable TSB also is referenced.

This index lists ECM PROM's for the 1980-95 vehicles. It does not contain ID codes and part numbers for all PROM's used in all GM vehicles. NOTE: GM flash PROM's (EEPROM's) can only be updated at GM Dealerships with factory-supplied equipment. These cars will not display a PROM ID.

By following the steps outlined below, you can use the PROM index to determine if the problem you are diagnosing can possibly be corrected by installing a revised PROM. The PROM index tables are organized by model year, engine displacement, and engine code (the eighth digit of the Vehicle Identification Number). The table columns are arranged as shown below:

Example of Table Column Arrangement

SCAN PROM PROM PART SUPERSEDING TSB REFERENCE

ID CODE (BCC) NUMBER ID PART NUMBER NUMBER

(1) (2) (3) (4) (5)

.....
.....

9461 8958 AMU 16058955R 8290 01228290 86194

Column 1, SCAN ID:

The scan ID is the internal PROM identification number transmitted on the ECM data stream and displayed by the scanner as PROM ID. The PROM records for each year and engine are listed numerically by this scan ID.

Column 2, PROM CODE:

These are the numbers and letters marked on the top of the PROM itself. The numbers are often referred to as the "external PROM ID." The letters are often called the "broadcast code." Together they are the external PROM code.

Column 3, PROM P/N:

This is the GM part number for the PROM identified by the codes in columns 1 and 2.

Column 4, SUPERSEDING ID PROM PART NUMBER:

Use the superseding scan ID to locate the newer PROM in the table. If the scan ID for the superseding PROM is not known, the PROM broadcast code is listed here. If the PROM is superseded by a newer PROM, that part number is listed here.

Column 5, TSB REFERENCE NUMBER

The TSB NUMBER column identifies the original TSB that released this PROM for service. Whenever possible you should refer to the TSB for additional information before changing a PROM. The bulletin may list other parts that must be installed when the PROM is changed, or it may provide additional troubleshooting information. To find a TSB, see Reading Technical Service Bulletins. See: Reading Technical Service Bulletins This will display all the TSB's for that particular vehicle.

EXPANDED FOOTNOTES Here you will find SUPERSEDING SCAN ID, PROM PART NUMBERS, symptoms and additional parts that need to be replaced when servicing the PROM.

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PROM - Programmable Read Only Memory: Application and ID Additional PROM Information

New ECM PROMs for GM vehicles may be released for service at any time. The information in this system is accurate to the best of the publisher's knowledge and the publication date of the disk. Before ordering a PROM, consult with a GM parts and service dealer to verify the latest part number information. Scanner PROM ID information for earlier-model vehicles (1980-83) is less complete than for later models. To accurately identify PROM's in earlier vehicles, it may be necessary to check the external PROM code marked on the PROM.

General Motors has often recommended that dealership technicians check the PROM history of a vehicle and install the most recent PROM revision before performing other diagnostic operations. Each succeeding PROM revision for a specific vehicle includes all previous revisions. Therefore, whenever you consider changing a PROM, review the entire PROM history to see if any revision covered the current driveability problem. Installing the most recent PROM revision may be impractical however for an independent service facility, particularly if the latest PROM revision does not address the specific driveability problem of the vehicle.

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Line	Label Markings	Explanation
1	"DELCO"	Identifies Delco as manufacturer
2	"ARCL"	BROAD CAST CODE part identifier
3	"4625"	"EXTERNAL ID" number

Line	Label Markings	Explanation
1	"ARCL"	BROAD CAST CODE part identifier
2	"1613"	First four digits of 8-digit part number
3	"4624"	Last four digits of 8-digit part number

PROM - Programmable Read Only Memory: Application and ID PROM/MEMCAL Identification Marks

File In Section: 6E - Engine Fuel & Emission

Bulletin No.: 44-65-01

Date: October, 1994

Subject: New PROM/MEMCAL Identification Markings

Models: 1995 and Prior Passenger Cars and Trucks

Note:

For the purposes of this document, the terms PROM and MEMCAL will be used interchangeably.

To simplify identification of service PROMs. a new external marking format will be implemented. Parts manufactured after Sept. 1994 will feature these new markings. This change will place the full 8-digit service part number on the PROM, in place of the old 4-digit "EXTERNAL ID" number. In the past, parts and service personnel could not identify a PROM without using a cross-reference table that matched external IDs and service numbers. In the future, the cross-reference table will not be required for PROMs; parts will be ordered directly from the number appearing on the PROM. However, the label will retain the broadcast code alpha characters to allow continued use of cross-reference charts, if so desired.

Old Marking Format:

New Marking Format:

^ Ordering the above PROM from the old marking format would require using a cross-reference chart to determine a service part number, based on the BROAD CAST CODE and EXTERNAL ID NUMBERS.

^ To order from the new format, simply combine the 2nd and 3rd lines to form an 8-digit part number that can be directly ordered from SPO (number 16134624 in the above example).

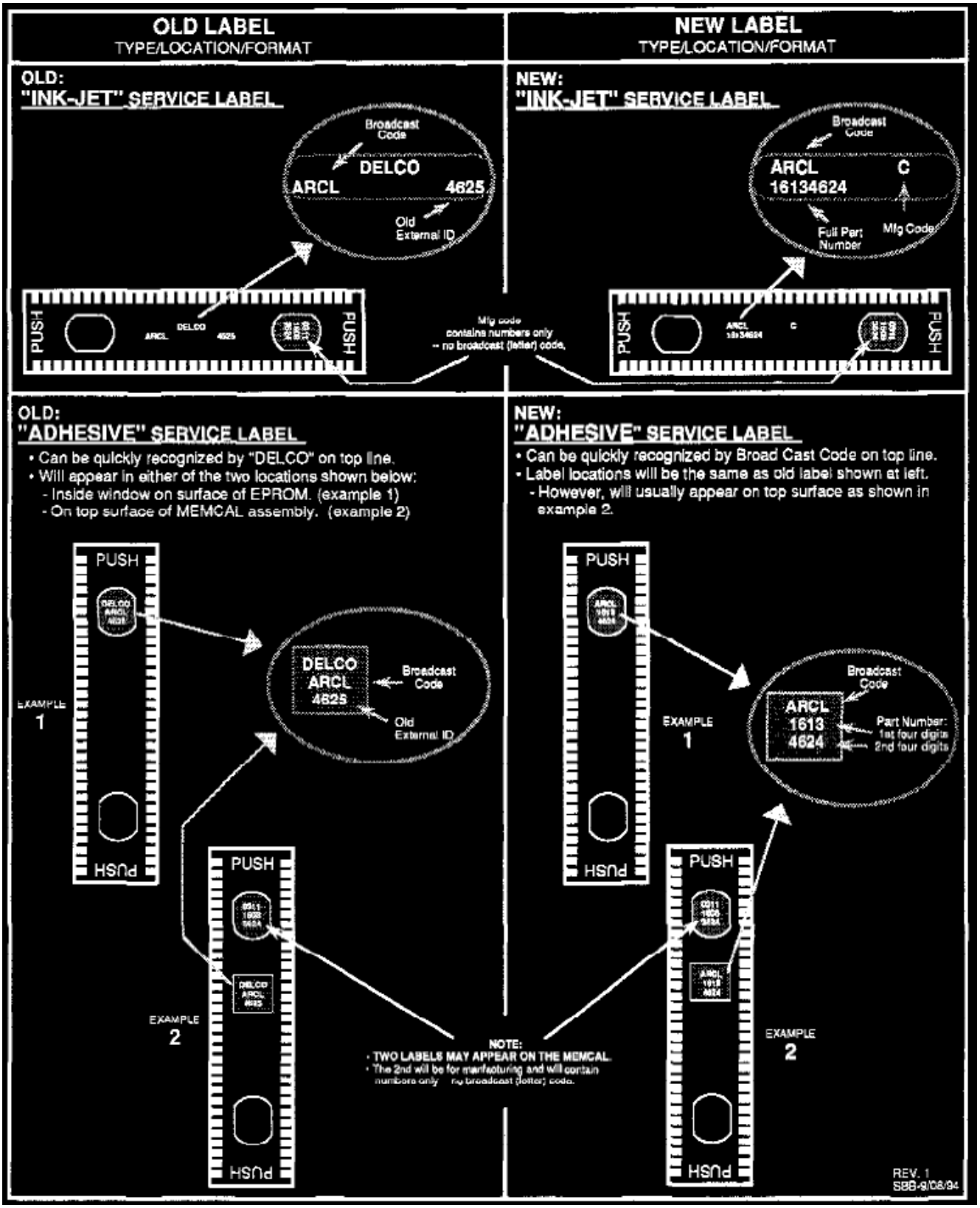
As these changes are phased into the parts inventory, it should be noted that dealers will continue to see parts with both formats for some time in the future. This is because:

^ Millions of vehicles have already been built with the old format.

^ SPO has existing stock of MEMCALs and PROMs with the old format.

^ PROMS with 7-digit part numbers (representing less than 10% of current part numbers) will continue to use the old format. The 7-digit part numbers are easily identified because they always begin with "122xxxx".

Due to manufacturing processes, more than one 8-digit part number may appear on a MEMCAL. In this event, service personnel should use the label on the exterior cover of the MEMCAL assembly. To avoid confusion, only the service label will include the BROAD CAST CODE, consisting of letter characters (I.E., ARCL).


OLD LABEL
TYPE/LOCATION/FORMAT
NEW LABEL
TYPE/LOCATION/FORMAT
OLD:
"INK-JET" SERVICE LABEL
Broadcast Code
DELCO
ARCL
4625
Old External ID
PUSH
Mfg code contains numbers only -- no broadcast (letter) code.
NEW:
"INK-JET" SERVICE LABEL
Broadcast Code
ARCL
C
16134624
Full Part Number
Mfg Code
OLD:
"ADHESIVE" SERVICE LABEL
• Can be quickly recognized by "DELCO" on top line.
• Will appear in either of the two locations shown below:
- Inside window on surface of EPROM. (example 1)
- On top surface of MEMCAL assembly. (example 2)
EXAMPLE 1
DELCO
ARCL
4825
Broadcast Code
Old External ID
EXAMPLE 2
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- However, will usually appear on top surface as shown in example 2.
EXAMPLE 1
ARCL
1613
4624
Broadcast Code
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EXAMPLE 2
NOTE:
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REV. 1
SBB-9/06/94

CHANGES TO MEMCAL/PROM LABELING FORMATS

^ MEMCALs may use either INK-JET or ADHESIVE labels, as shown.

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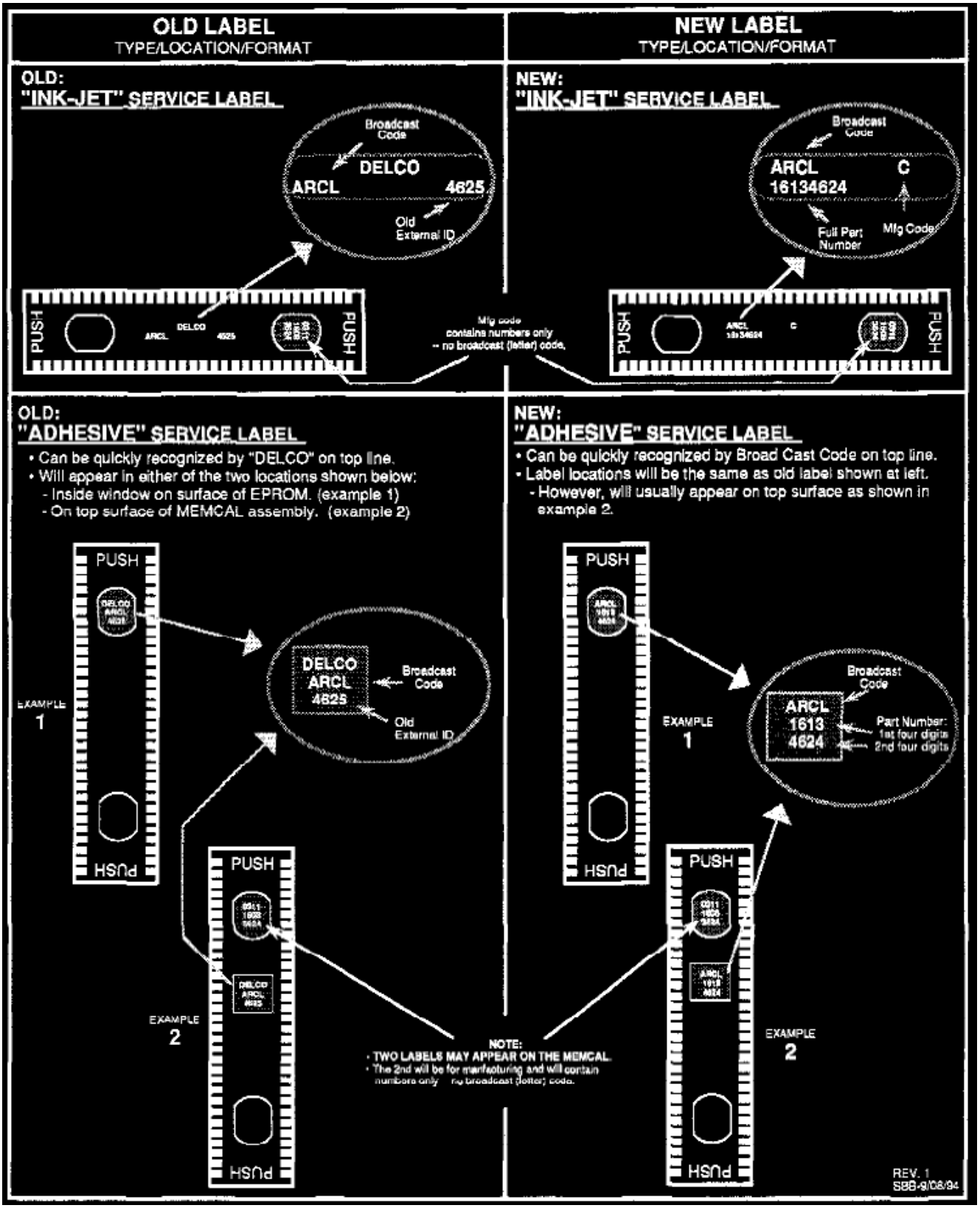
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PROM - Programmable Read Only Memory: Application and ID Reading Technical Service Bulletins

Always read any Technical Service Bulletins (TSB's) referenced before replacing a PROM.

Service bulletins list parts that must be installed when a PROM is changed, and provide information on trouble codes, troubleshooting and driveability problems for which the PROM was released.

To find applicable TSB's:

Complete TSB Listing

1. Hold down right mouse button and select "Vehicle" in the "Pull Right Menu". 2. Select the TSB ICON. 3. Select "All Technical Service Bulletins by Number, Date, and Title". 4. Select "Sort by Number", "Sort by Date", or "Sort by Title". 5. Scroll up or down to find the desired TSB.

PROM TSB Listing Only

1. Hold down right mouse button and select "Technical Service Bulletins" in the "Pull Right Menu". 2. Select "All Technical Service Bulletins for PROM - Programmable Read Only Memory". 3. Select "Sort by Number", "Sort by Date", or "Sort by Title". 4. Scroll up or down to find the desired TSB.

PROM - Programmable Read Only Memory: Application and ID Reading Technical Service Bulletins

Always read any Technical Service Bulletins (TSB's) referenced before replacing a PROM.

Service bulletins list parts that must be installed when a PROM is changed, and provide information on trouble codes, troubleshooting and driveability problems for which the PROM was released.

To find applicable TSB's:

Complete TSB Listing

1. Hold down right mouse button and select "Vehicle" in the "Pull Right Menu". 2. Select the TSB ICON. 3. Select "All Technical Service Bulletins by Number, Date, and Title". 4. Select "Sort by Number", "Sort by Date", or "Sort by Title". 5. Scroll up or down to find the desired TSB.

PROM TSB Listing Only

1. Hold down right mouse button and select "Technical Service Bulletins" in the "Pull Right Menu". 2. Select "All Technical Service Bulletins for PROM - Programmable Read Only Memory". 3. Select "Sort by Number", "Sort by Date", or "Sort by Title". 4. Scroll up or down to find the desired TSB.

PROM - Programmable Read Only Memory: Application and ID Footnotes 1 Thru 50

[1] Also needs EGR P/N 1706739.

[2] Also requires EGR P/N 17111295.

[3] Requires Throttle Body service P/N 17067142, EGR valve service P/N 17067111, Injector service kit P/N 17067976.

[4] Requires Throttle Body service P/N 17067142, EGR valve service P/N 17067107, Injector service kit P/N 17067976.

[5] Requires Throttle Body service P/N 17067144, EGR valve service P/N 17067110, Injector service kit P/N 17067976.

[6] PROM I.D. 7080 KJ is also acceptable for PROM I.D. 5853 KJ only. Requires Throttle Body service P/N 17067144, EGR valve service P/N 17067108 (FED), 17067144 (CAL), Injector service kit P/N 17067976.

[7] Required Throttle Body service P/N 17067142, EGR valve service P/N 17067107 (FED), 17068210 (CAL), Injector service kit P/N 17067976.

[8] Requires Throttle Body service P/N 17068019, EGR valve service P/N 17067109, Injector service kit P/N 17067976.

[9] For Federal - Use 01226047 (PROM CODE 7654 BKW). For California - Use 01226049 (PROM CODE 7665 BKY).

[10] For Federal - Use 01226054. For California - Use 01226056

[11] For Federal - Use 01226055. For California - Use 01226057.

[12] For Federal - Use 01226046 (PROM CODE 7648 BKU). For California - Use 01226049 (PROM CODE 7665 BKY).

[13] For federal - Use 01226046 (PROM CODE 7648 BKU). For California - Use 01226048 (PROM CODE 7659 BKX).

[14] ECM may have been replaced by service ECM P/N 16019710 (1225500).

[15] ECM may also be 16018161. ECM may also have been replaced by service ECM P/N 16018000 (1225330).

[16] ECM may also be 16018201. ECM may also have been replaced by service ECM P/N 16018000 (1225330).

[17] ECM may also be 16018211. ECM may have been replaced by service ECM P/N 16018000 (1225330).

[18] ECM may also be 16023761. ECM may have been replaced by service ECM P/N 16018000 (1225330).

[19] ECM may also be 16018101. ECM may have been replaced by service ECM P/N 16018000 (1225330).

[20] For 2-board ECM only.

[21] May need EGR valve P/N 17079563. Original equipment P/N 16029014.

[22] Original equipment PROM P/N 16017094, now 16025254

[23] Original equipment PROM P/N 16017224, now 16025264.

[24] Also needs EGR valve P/N 17079013. Original equipment PROM P/N 16030034 (PROM ID: BOH).

[25] Requires kit P/N 25522748 containing: Wiring harness jumper P/N 12043500, Relay P/N 25522747, Foam P/N 25522723, EGR P/N 17079799.

[26] Needs EGR valve P/N 17079818.

[27] For (MY7) - Use 01226473 (SCAN I.D. = 3941). For (M19) - Use 01226474 (SCAN I.D. = 3951).

[28] For (MY7) or (M19, C60) - Use 01226473 (SCAN I.D. = 3941). For (M19) - Use 01226474 (SCAN I.D. = 3951).

[29] ECM may also be 16023561(M5), or 16033061(M4 with A/C).

[30] For F62 axle - Use 01226441 (SCAN I.D. = 3622). For F17 axle - Use 01226439 (SCAN I.D. = 3332).

[31] For one_board ECM only.

[32] Requires Thermac Sensor P/N 8997916.

[33] For Federal - Use 01227729 (SCAN I.D. = 7729). For California - Use 01227728 (SCAN I.D. = 7728).

[34] Use 01227629 (SCAN I.D. = 7629) only to resolve surge or chuggle.

[35] Use 01227381 (SCAN I.D. = 7381) only to resolve chuggle.

[36] Use 01227386 (SCAN I.D. = 7386) only to resolve chuggle.

[37] Retrofit PROM - Does not supersede the regular replacement service PROM. To be used only as required to resolve cases of chuggle.

[38] Retrofit PROM - Supersedes all previous service PROM part numbers. To be used as both the regular service replacement (PROM-damaged or

defective), and to resolve cases of chuggle.

[39] Retrofit PROM - Supersedes all previous service PROM part numbers. To be used as both the regular service replacement (PROM-damaged or

defective), and to resolve cases of chuggle, detonation, or flatness.

[40] Retrofit PROM - Does not supersede the regular replacement service PROMS. To be used only as required to resolve cases of chuggle, detonation,

or flatness.

[41] Need EGR valve P/N 17111577 (Federal only).

[42] For use with P215/65 tires - use 01228290 (SCAN I.D. = 8290). For use with P235/60, P245/50 tires - use 01228291 (SCAN I.D. = 8291).

[43] For use with P215/65 tires - use 01228292 (SCAN I.D. - 8292). For use with P235/60, P245/50 tires - use 01228293 (SCAN I.D. = 8293).

[44] Use 16143570 (SCAN I.D. = 3531) for hot hard restart (Requires Fuel Pump P/N 25115764, Fuel Sender P/N 25093526). Use 16143459 (SCAN

I.D. = 3571) for Code 42, Spark Knock, High Idle.

[45] Use 16143455 (SCAN I.D. = 3511) for hot hard restart (Requires Fuel Pump P/N 25115764, Fuel Sender P/N 25093526). Use 16143453 (SCAN

I.D. = 3501) for Code 42, Spark Knock, High Idle.

[46] Use 16143575 (SCAN I.D. = 3541) for hot hard restart (Requires Fuel Pump P/N 25115764). Use 16143460 (SCAN I.D. = 3581) for Code 42,

Spark Knock, High Idle.

[47] Use 16143580 (SCAN I.D. = 3551) for hot hard restart (Requires Fuel Pump P/N 25115764). Use 16143462 (SCAN I.D. = 3591) for Code 42,

Spark Knock, High Idle.

[48] Use 16143457 (SCAN I.D. = 3521) for hot hard restart (Requires Fuel Pump P/N 25115925, Fuel Sender P/N 25092778). Use 16143466 (SCAN

I.D. = 3481) for Code 42, Spark Knock, High Idle.

[49] Use 16143452 (SCAN I.D. = 3491) for hot hard restart (Requires Fuel Pump P/N 25115925, Fuel Sender P/N 25092778). Use 16143463 (SCAN

I.D. = 3451) for Code 42, Spark Knock, High Idle.

[50] Needs air injection service kit (P/N 10115773) and new vehicle emission control label.

PROM - Programmable Read Only Memory: Application and ID Footnotes 51 Thru 100

[51] Must be ordered with service kit P/N 10115773.

[52] With this PROM installed, use 1987-88 2.8L speed density engine driveability and emissions manual.

[53] PROM update eliminates MAF sensor, replacing it with a speed density system. With a 1990 or earlier primary cartridge, I.D. vehicle on scanner

as a 1989 model (VIN = K-1-W).

[54] For 2WD use 16120099 (SCAN I.D. = 9941). For 4WD use 16120109 (SCAN I.D. = 9901).

[55] For 2.73 (GU2) Axle use 16120077 (SCAN I.D. = 9891). For 3.08 (GU4) Axle use 16120082 (SCAN I.D. = 9901). For 3.42 (GU6) and 3.73

(GT4) Axles use 16120086 (SCAN I.D. = 9911).

[56] For 2WD use 16120042 (SCAN I.D. = 9991). For 4WD use 16120129 (SCAN I.D. = 0011).

[57] Needs accelerator pump check ball spring P/N 17069583.

[58] For false Code 44 on long coast down, use retrofit service PROM 01228486 AAND 1050. For regular service replacement, use PROM 16062797

AAND 2798.

[59] For false Code 44 on long coast down, use retrofit service PROM 01228487 AANF 1052. For regular service replacement, use PROM 16062801

AANF 2802.

[60] USE 16143545 (SCAN I.D. = 3461) For hot hard restart (Requires Fuel Pump P/N 25115764, Fuel Sender P/N 25093744). Use 16143465 (SCAN

I.D. = 3471) for Code 42, Spark Knock, High Idle.

[61] With this PROM installed, use 1987-88 2.8L speed density engine driveability and emissions manual.

[62] For use with model C1 Trucks - Use 16121162 (SCAN I.D. = 3511). For use with model C2, K, K2, AND K1000 Trucks - use 16121166 (SCAN

I.D. = 3521).

[63] Also requires installation of new EGR valve package P/N 17112238 (Contains EGR valve P/N 17090078 and a gasket).

[64] Use 16181863 (SCAN I.D. = 0844) for cold start stall. Use 16181859 (SCAN I.D. = 0834) only if required to solve both cold start stall and

chuggle.

[65] Use 16181871 (SCAN I.D. = 0864) for cold start stall. Use 16181867 (SCAN I.D. = 0854) only if required to solve both cold start stall and

chuggle.

[66] Use 16165848 (SCAN I.D. = 5614) for cold start stall. Use 16165843 (SCAN I.D. = 5624) only if required to solve both cold start stall and

chuggle.

[67] Do not rely on the scanner ID to determine which PROM is in a vehicle. Look at the BCC on the PROM to be sure. Do not confuse with some

1991 models with a 2.84 axle ratio and a Federal emissions pkg which used scanner ID 5644 but had a BCC of AWJD.

[68] This PROM may have a negative impact on fuel economy.

[69] Cannot be used on vehicles that do not have digital EGR valves.

[70] Use 16165839 (SCAN I.D. = 5634) for cold start stall. Use 16165829 (SCAN I.D. = 5644) only if required to solve both cold start stall and

chuggle.

[71] Use 16181883 (SCAN I.D. = 0894) for cold start stall. Use 16181875 (SCAN I.D. = 0874) only if required to solve both cold start stall and

chuggle.

[72] Use 16181887 (SCAN I.D. = 0904) for cold start stall. Use 16181879 (SCAN I.D. = 0884) only if required to solve both cold start stall and

chuggle.

[73] This PROM may have a negative impact on fuel economy.

[74] PROM can only be used with ECM P/N 16144288.

[75] Make certain the vehicle has been updated with previously attempted service fixes as follows: EGR valve P/N 17090156 (stamped on valve)

17112373 (GMSPO kit), PCV valve P/N 25098542, ESC module P/N 16175099 (BCC=BARC).

[76] For vehicles with sleeve bearing engines.

[77] Combination detonation and neutral gear rattle PROM available.

[78] Needs ESC P/N 16175099.

[79] Model 2DDM Transmissions - Check dealer records to see if the torque converter has already been replaced with P/N 8650935 (Tagged BCC:

DGAF). Trans. with torque converters with P/N 8656959 (Tagged BCC: DG5F) need to replace it with P/N 8650935.

[80] For dedicated natural gas vehicles. Order with kit P/N 12545589 unless the only problem is idle fluctuation.

[81] For chuggle at 40-45 condition, use PROM only. For tip-in hesitation only, use EGR valve only - P/N 17078431. For cold driveability hesitation,

use both PROM and EGR.

[82] Requires supplementary tune-up label, spark bypass relay kit P/N 14086983, spark plugs P/N 5614009, sun visor starting label P/N 14085150.

Also, remove and discard fuse labeled "crank" from fuse BLK #2 position (3 Amp. Fuse).

[83] Manual transmission cars should also be updated with the clutch anticipate switch per dealer service bulletin number. 91-472-7C.

[84] Cold driveability, use with PROM 0051 AAF (G057). REQUIRES THROTTLE BODY SERVICE P/N 17067142, EGR VALVE SERVICE P/N

17067111, INJECTOR SERVICE KIT P/N 17067976.

[85] Cold driveability, use with PROM 0050 AAF (G057). REQUIRES THROTTLE BODY SERVICE P/N 17067142, EGR VALVE SERVICE P/N

17067111, INJECTOR SERVICE KIT P/N 17067976.

[86] Exhaust noise (requires catalytic converter), cold driveability, use with PROM 5884 BH (G057). REQUIRES THROTTLE BODY SERVICE

P/N 17068019, EGR VALVE SERVICE P/N 17067109, INJECTOR SERVICE KIT P/N 17067976.

[87] Exhaust noise (requires catalytic converter), cold driveability, use with PROM 5869 BH (G057). REQUIRES THROTTLE BODY SERVICE

P/N 17068019, EGR VALVE SERVICE P/N 17067109, INJECTOR SERVICE KIT P/N 17067976.

[88] Exhaust noise (requires catalytic converter), cold driveability, use with PROM 5779 KB (G057). REQUIRES THROTTLE BODY SERVICE

P/N 17067144, EGR VALVE SERVICE P/N 17067110, INJECTOR SERVICE KIT P/N 17067976.

[89] Exhaust noise (requires catalytic converter), cold driveability, use with PROM 5778 KB (G057). REQUIRES THROTTLE BODY SERVICE

P/N 17067144, EGR VALVE SERVICE P/N 17067110, INJECTOR SERVICE KIT P/N 17067976.

[90] Cold driveability, use with PROM 5854 KJ (G057). PROM I.D. 7080 KJ IS ALSO ACCEPTABLE FOR PROM I.D. 5853 KJ ONLY.

REQUIRES THROTTLE BODY SERVICE P/N 17067144, EGR VALVE SERVICE P/N 17067108 (FED), 17067144 (CAL), INJECTOR SERVICE KIT P/N 17067976.

[91] Cold driveability, use with PROM 5853 KJ (G057). PROM I.D. 7080 KJ IS ALSO ACCEPTABLE FOR PROM I.D. 5853 KJ ONLY.

REQUIRES THROTTLE BODY SERVICE P/N 17067144, EGR VALVE SERVICE P/N 17067108 (FED), 17067144 (CAL), INJECTOR SERVICE KIT P/N 17067976.

[92] Cold driveability, use with PROM 5861 KK (G057). REQUIRED THROTTLE BODY SERVICE P/N 17067142, EGR VALVE SERVICE P/N

17067107 (FED), 17068210 (CAL), INJECTOR SERVICE KIT P/N 17067976.

[93] Cold driveability, use with PROM 5860 KK (G057). REQUIRED THROTTLE BODY SERVICE P/N 17067142, EGR VALVE SERVICE P/N

17067107 (FED), 17068210 (CAL), INJECTOR SERVICE KIT P/N 17067976.

[94] Exhaust noise (requires catalytic converter), cold driveability, use with PROM 5786 LW (G057). REQUIRES THROTTLE BODY SERVICE

P/N 17067142, EGR VALVE SERVICE P/N 17067107, INJECTOR SERVICE KIT P/N 17067976.

[95] Exhaust noise (requires catalytic converter), cold driveability, use with PROM 5785 LW (G057). REQUIRES THROTTLE BODY SERVICE

P/N 17067142, EGR VALVE SERVICE P/N 17067107, INJECTOR SERVICE KIT P/N 17067976.

[96] Cold driveability, use with PROM 7088 LY (G057). REQUIRES THROTTLE BODY SERVICE P/N 17067142, EGR VALVE SERVICE P/N

17067111, INJECTOR SERVICE KIT P/N 17067976.

[97] Cold driveability, use with PROM 7087 LY (G057). REQUIRES THROTTLE BODY SERVICE P/N 17067142, EGR VALVE SERVICE P/N

17067111, INJECTOR SERVICE KIT P/N 17067976.

[98] Chuggle at 40-45 mph, cold driveability hesitation. FOR CHUGGLE AT 40-45 CONDITION, USE PROM ONLY. FOR TIP-IN HESITATION

ONLY, USE EGR VALVE ONLY - P/N 17078431. FOR COLD DRIVEABILITY HESITATION, USE BOTH PROM AND EGR.

[99] Driveability correction for heavy chuggle. REQUIRES KIT P/N 25522748 CONTAINING: WIRING HARNESS JUMPER P/N 12043500,

RELAY P/N 25522747, FOAM P/N 25522723, EGR P/N 17079799.

[100] Cold startability adjustment. REQUIRES SUPPLEMENTARY TUNE-UP LABEL, SPARK BYPASS RELAY KIT P/N 14086983, SPARK

PLUGS P/N 5614009, SUN VISOR STARTING LABEL P/N 14085150. ALSO, REMOVE AND DISCARD FUSE LABELED "CRANK" FROM FUSE BLK #2 POSITION (3 AMP. FUSE).

PROM - Programmable Read Only Memory: Application and ID Footnotes 101 Thru 150

[101] Driveability correction for heavy chuggle. REQUIRES KIT P/N 25522748 CONTAINING: WIRING HARNESS JUMPER P/N 12043500,

RELAY P/N 25522747, FOAM P/N 25522723, EGR P/N 17079799.

[102] Cold startability adjustment. REQUIRES SUPPLEMENTARY TUNE-UP LABEL, SPARK BYPASS RELAY KIT P/N 14086983, SPARK

PLUGS P/N 5614009, SUN VISOR STARTING LABEL P/N 14085150. ALSO, REMOVE AND DISCARD FUSE LABELED "CRANK" FROM FUSE BLK #2 POSITION (3 AMP. FUSE).

[103] Cold startability adjustment. REQUIRES SUPPLEMENTARY TUNE-UP LABEL, SPARK BYPASS RELAY KIT P/N 14086983, SPARK

PLUGS P/N 5614009, SUN VISOR STARTING LABEL P/N 14085150. ALSO, REMOVE AND DISCARD FUSE LABELED "CRANK" FROM FUSE BLK #2 POSITION (3 AMP. FUSE).

[104] Cold startability adjustment. REQUIRES SUPPLEMENTARY TUNE-UP LABEL, SPARK BYPASS RELAY KIT P/N 14086983, SPARK

PLUGS P/N 5614009, SUN VISOR STARTING LABEL P/N 14085150. ALSO, REMOVE AND DISCARD FUSE LABELED "CRANK" FROM FUSE BLK #2 POSITION (3 AMP. FUSE).

[105] Surge. RETROFIT PROM - DOES NOT SUPERSEDE THE REGULAR REPLACEMENT SERVICE PROM. TO BE USED ONLY AS

REQUIRED TO RESOLVE CASES OF CHUGGLE.

[106] Surge and CODE 51. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE USED AS BOTH

THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE.

[107] Surge and CODE 51. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE USED AS BOTH

THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE.

[108] Surge and CODE 51. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE USED AS BOTH

THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE.

[109] Surge and CODE 51. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE USED AS BOTH

THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE.

[110] Surge. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE USED AS BOTH THE

REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE.

[111] Surge and CODE 51. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE USED AS BOTH

THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE.

[112] Surge and CODE 51. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE USED AS BOTH

THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE, DETONATION, OR FLATNESS.

[113] Surge and CODE 51. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE USED AS BOTH

THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE, DETONATION, OR FLATNESS.

[114] Surge, flatness or tip-in hesitation. RETROFIT PROM - DOES NOT SUPERSEDE THE REGULAR REPLACEMENT SERVICE PROMS.

TO BE USED ONLY AS REQUIRED TO RESOLVE CASES OF CHUGGLE, DETONATION, OR FLATNESS.

[115] FOR USE WITH P215/65 TIRES - USE 01228290 (SCAN I.D. = 8290). FOR USE WITH P235/60, P245/50 TIRES - USE 01228291 (SCAN

I.D. = 8291).

[116] FOR USE WITH P215/65 TIRES - USE 01228290 (SCAN I.D. = 8290). FOR USE WITH P235/60, P245/50 TIRES - USE 01228291 (SCAN

I.D. = 8291).

[117] Spark knock only. USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL

SENDER P/N 25093526). USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[118] Spark knock only. USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL

SENDER P/N 25093526). USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[119] Spark knock. USE 16143575 (SCAN I.D. = 3541) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE 16143460

(SCAN I.D. = 3581) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[120] Detonation. USE 16143580 (SCAN I.D. = 3551) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE 16143462

(SCAN I.D. = 3591) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[121] Stall, sags, hesitation. USE 16143575 (SCAN I.D. = 3541) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE

16143460 (SCAN I.D. = 3581) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[122] USE 16143575 (SCAN I.D. = 3541) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE 16143460 (SCAN I.D. =

3581) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[123] USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[124] USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[125] USE 16143457 (SCAN I.D. = 3521) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER P/N 25092778).

USE 16143466 (SCAN I.D. = 3481) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[126] USE 16143452 (SCAN I.D. = 3491) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER P/N 25092778).

USE 16143463 (SCAN I.D. = 3451) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[127] USE 16143457 (SCAN I.D. = 3521) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER P/N 25092778).

USE 16143466 (SCAN I.D. = 3481) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[128] USE 16143452 (SCAN I.D. = 3491) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER P/N 25092778).

USE 16143463 (SCAN I.D. = 3451) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[129] Engine stall and/or hesitation after cold start. NEEDS AIR INJECTION SERVICE KIT (P/N 10115773) AND NEW VEHICLE EMISSION

CONTROL LABEL.

[130] Engine stall and/or hesitation after cold start. NEEDS AIR INJECTION SERVICE KIT (P/N 10115773) AND NEW VEHICLE EMISSION

CONTROL LABEL.

[131] Driveability conditions and/or stored engine codes. WITH THIS PROM INSTALLED, USE 1987-88 2.8L SPEED DENSITY ENGINE

DRIVEABILITY AND EMISSIONS MANUAL.

[132] Cold stall and chuggle. DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE

BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PKG. WITH USED SCANNER ID 5644 BUT HAD A BCC OF AWJD.

[133] Driveability conditions and/or stored engine codes. WITH THIS PROM INSTALLED, USE 1987-88 2.8L SPEED DENSITY ENGINE

DRIVEABILITY AND EMISSIONS MANUAL.

[134] Tip-in hesitation on acceleration; engine stall or sag on cold start; engine stall on deceleration; check engine light with CODES 23,25,33, or 34;

or engine speed flare on clutch operation, with manual transmission equipped vehicle. WITH THIS PROM INSTALLED, USE 1987-88 2.8L SPEED DENSITY ENGINE DRIVEABILITY AND EMISSIONS MANUAL.

[135] Tip-in hesitation on acceleration; engine stall or sag on cold start; engine stall on deceleration; check engine light with CODES 23,25,33, or 34;

or engine speed flare on declutch operation with manual transmission equipped vehicle. WITH THIS PROM INSTALLED, USE 1987-88 2.8L SPEED DENSITY ENGINE DRIVEABILITY AND EMISSIONS MANUAL.

[136] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[137] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[138] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[139] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[140] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[141] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[142] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[143] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[144] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[145] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[146] PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER

PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[147] PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER

PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[148] PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER

PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[149] Tip-in hesitation on acceleration; engine stall or sag on cold start; engine stall on deceleration; check engine light with CODES 23,25,33, or 34;

or engine speed flare on declutch operation with manual transmission equipped vehicle. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[150] Tip-in hesitation on acceleration; engine stall or sag on cold start; engine stall on deceleration; check engine light with CODES 23,25,33, or 34;

or engine speed flare on declutch operation with manual transmission equipped vehicle. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

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[151] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[152] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[153] Driveability improvement and eliminate FALSE "Service Engine Soon" lights. FOR 2WD USE 16120099 (SCAN I.D. = 9941). FOR 4WD

USE 16120109 (SCAN I.D. = 9901).

[154] Driveability improvement and eliminate FALSE "Service Engine Soon" lights. FOR 2.73 (GU2) AXLE USE 16120077 (SCAN I.D. = 9891).

FOR 3.08 (GU4) AXLE USE 16120082 (SCAN I.D. = 9901). FOR 3.42 (GU6) AND 3.73 (GT4) AXLES USE 16120086 (SCAN I.D. = 9911).

[155] Driveability improvement and eliminate FALSE "Service Engine Soon" lights. FOR 2WD USE 16120042 (SCAN I.D. = 9991). FOR 4WD

USE 16120129 (SCAN I.D. = 0011).

[156] Prom calibration. FOR FALSE CODE 44 ON LONG COAST DOWN, USE RETROFIT SERVICE PROM 01228486 AAND 1050. FOR

REGULAR SERVICE REPLACEMENT, USE PROM 16062797 AAND 2798.

[157] FOR FALSE CODE 44 ON LONG COAST DOWN, USE RETROFIT SERVICE PROM 01228487 AANF 1052. FOR REGULAR SERVICE

REPLACEMENT, USE PROM 16062801 AANF 2802.

[158] Spark knock only. USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL

SENDER P/N 25093526). USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[159] Spark knock only. USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL

SENDER P/N 25093526). USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[160] Detonation. USE 16143580 (SCAN I.D. = 3551) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE 16143462

(SCAN I.D. = 3591) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[161] USE 16143545 (SCAN I.D. = 3461) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093744).

USE 16143465 (SCAN I.D. = 3471) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[162] USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[163] USE 16143545 (SCAN I.D. = 3461) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093744).

USE 16143465 (SCAN I.D. = 3471) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[164] USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[165] USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[166] Hard start when hot and detonation. USE 16143457 (SCAN I.D. = 3521) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N

25115925, FUEL SENDER P/N 25092778). USE 16143466 (SCAN I.D. = 3481) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[167] Hard start when hot and detonation. USE 16143452 (SCAN I.D. = 3491) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N

25115925, FUEL SENDER P/N 25092778). USE 16143463 (SCAN I.D. = 3451) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[168] Engine stall and/or hesitation after cold start. NEEDS AIR INJECTION SERVICE KIT (P/N 10115773) AND NEW VEHICLE EMISSION

CONTROL LABEL.

[169] Cold stall and chuggle. DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE

BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PKG. WHICH USED SCANNER ID 5644 BUT HAD A BCC OF AWJD.

[170] Engine stall and/or hesitation after cold start. NEEDS AIR INJECTION SERVICE KIT (P/N 10115773) AND NEW VEHICLE EMISSION

CONTROL LABEL.

[171] Engine stall and/or hesitation after cold start. MUST BE ORDERED WITH SERVICE KIT P/N 10115773.

[172] Driveability conditions and/or stored engine codes. WITH THIS PROM INSTALLED, USE 1987-88 2.8L SPEED DENSITY ENGINE

DRIVEABILITY AND EMISSIONS MANUAL.

[173] Driveability conditions and/or stored engine codes. WITH THIS PROM INSTALLED, USE 1987-88 2.8L SPEED DENSITY ENGINE

DRIVEABILITY AND EMISSIONS MANUAL.

[174] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[175] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[176] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[177] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[178] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[179] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[180] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[181] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[182] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[183] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[184] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[185] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[186] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[187] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[188] Driveability conditions, and/or CODES 23,25,33,34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[189] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[190] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[191] Information on PROM calibrations. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM.

WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[192] Information on PROM calibrations. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM.

WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[193] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[194] Driveability conditions and/or stored engine codes. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[195] FOR USE WITH MODEL C1 TRUCKS - USE 16121162 (SCAN I.D. = 3511). FOR USE WITH MODEL C2, K, K2, AND K1000 TRUCKS -

USE 16121166 (SCAN I.D. = 3521).

[196] Engine surge. ALSO REQUIRES INSTALLATION OF NEW EGR VALVE PACKAGE P/N 17112238 (CONTAINS EGR VALVE P/N

17090078 AND A GASKET).

[197] Engine stall and/or hesitation after cold start. NEEDS AIR INJECTION SERVICE KIT (P/N 10115773) AND NEW VEHICLE EMISSION

CONTROL LABEL.

[198] Engine stall and/or hesitation after cold start. NEEDS AIR INJECTION SERVICE KIT (P/N 10115773) AND NEW VEHICLE EMISSION

CONTROL LABEL.

[199] Cold stall and chuggle. DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE

BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PKG. WHICH USED SCANNER ID 5644 BUT HAD A BCC OF AWJD.

[200] Cold stall and chuggle. DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE

BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PKG. WHICH USED SCANNER ID 5644 BUT HAD A BCC OF AWJD.

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[201] Cold engine extended crank. USE 16181863 (SCAN I.D. = 0844) FOR COLD START STALL. USE 16181859 (SCAN I.D. = 0834) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[202] Cold engine extended crank. USE 16181863 (SCAN I.D. = 0844) FOR COLD START STALL. USE 16181859 (SCAN I.D. = 0834) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[203] Cold engine extended crank. USE 16181863 (SCAN I.D. = 0844) FOR COLD START STALL. USE 16181859 (SCAN I.D. = 0834) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[204] Cold engine extended crank. USE 16181871 (SCAN I.D. = 0864) FOR COLD START STALL. USE 16181867 (SCAN I.D. = 0854) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[205] Cold engine extended crank. USE 16181871 (SCAN I.D. = 0864) FOR COLD START STALL. USE 16181867 (SCAN I.D. = 0854) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[206] Cold stall and chuggle. DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE

BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PKG. WHICH USED SCANNER ID 5644 BUT HAD A BCC OF AWJD.

[207] Cold engine extended crank. USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[208] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[209] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[210] Cold engine extended crank. USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[211] Engine stall, long cranks/idle/decel/surge. CANNOT BE USED ON VEHICLES THAT DO NOT HAVE DIGITAL EGR VALVES.

[212] Cold stall and chuggle. DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE

BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PKG. WHICH USED SCANNER ID 5644 BUT HAD A BCC OF AWJD.

[213] Cold engine extended crank. USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[214] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[215] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[216] Cold start extended crank. Engine starts with ignition key cycled. USE 16181883 (SCAN I.D. = 0894) FOR COLD START STALL. USE

16181875 (SCAN I.D. = 0874) ONLY IF REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[217] Cold start extended crank, engine starts with ignition key cycled. USE 16181883 (SCAN I.D. = 0894) FOR COLD START STALL. USE

16181875 (SCAN I.D. = 0874) ONLY IF REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[218] Cold engine extended crank. USE 16181887 (SCAN I.D. = 0904) FOR COLD START STALL. USE 16181879 (SCAN I.D. = 0884) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[219] Cold engine extended crank. USE 16181887 (SCAN I.D. = 0904) FOR COLD START STALL. USE 16181879 (SCAN I.D. = 0884) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[220] Cold engine extended crank. USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[221] Surge or chuggle on decel and/or rough idle. PROM CAN ONLY BE USED WITH ECM P/N 16144288.

[222] Surge or chuggle on decel and/or rough idle. PROM CAN ONLY BE USED WITH ECM P/N 16144288.

[223] Engine stall. MANUAL TRANSMISSION CARS SHOULD ALSO BE UPDATED WITH THE CLUTCH ANTICIPATE SWITCH PER

DEALER SERVICE BULLETIN NO. 91-472-7C.

[224] USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF REQUIRED TO SOLVE

BOTH COLD START STALL AND CHUGGLE.

[225] USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF REQUIRED TO SOLVE

BOTH COLD START STALL AND CHUGGLE.

[226] USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF REQUIRED TO SOLVE

BOTH COLD START STALL AND CHUGGLE.

[227] Cold engine extended crank. USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[228] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[229] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[230] Surge or chuggle on decel and/or rough idle. PROM CAN ONLY BE USED WITH ECM P/N 16144288.

[231] MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED SERVICE FIXES AS FOLLOWS: EGR

VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[232] Driveability improvements. MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED SERVICE

FIXES AS FOLLOWS: EGR VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[233] Driveability improvements. MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED SERVICE

FIXES AS FOLLOWS: EGR VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[234] Driveablity improvements. MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED SERVICE

FIXES AS FOLLOWS: EGR VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[235] Driveability improvements. MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED SERVICE

FIXES AS FOLLOWS: EGR VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[236] Center Port Fuel Injection noise. FOR VEHICLES WITH SLEEVE BEARING ENGINES.

[237] Neutral gear rattle only. COMBINATION DETONATION AND NEUTRAL GEAR RATTLE PROM AVAILABLE.

[238] Driveability improvements. MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED SERVICE

FIXES AS FOLLOWS: EGR VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[239] TCC chuggle. MODEL 2DDM TRANSMISSIONS - CHECK DEALER RECORDS TO SEE IF THE TORQUE CONVERTER HAS

ALREADY BEEN REPLACED WITH P/N 8650935 (TAGGED BCC: DGAF). TRANS. WITH TORQUE CONVERTERS WITH P/N 8656959 (TAGGED BCC: DG5F) NEED TO REPLACE IT WITH P/N 8650935.

[240] Unstable idle in park or neutral/poor driveability. FOR DEDICATED NATURAL GAS VEHICLES. ORDER WITH KIT P/N 12545589

UNLESS THE ONLY PROBLEM IS IDLE FLUCTUATION.

[241] Driveability improvements. MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED SERVICE

FIXES AS FOLLOWS: EGR VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[242] Information on PROM calibrations. CANNOT BE USED ON VEHICLES THAT DO NOT HAVE DIGITAL EGR VALVES.

[243] TCC chuggle. MODEL 2DDM TRANSMISSIONS - CHECK DEALER RECORDS TO SEE IF THE TORQUE CONVERTER HAS

ALREADY BEEN REPLACED WITH P/N 8650935 (TAGGED BCC: DGAF). TRANS. WITH TORQUE CONVERTERS WITH P/N 8656959 (TAGGED BCC: DG5F) NEED TO REPLACE IT WITH P/N 8650935.

[244] TCC chuggle. MODEL 2DDM TRANSMISSIONS - CHECK DEALER RECORDS TO SEE IF THE TORQUE CONVERTER HAS

ALREADY BEEN REPLACED WITH P/N 8650935 (TAGGED BCC: DGAF). TRANS. WITH TORQUE CONVERTERS WITH P/N 8656959 (TAGGED BCC: DG5F) NEED TO REPLACE IT WITH P/N 8650935.

[245] Tip-in hesitation on acceleration; engine stall or sag on cold start; engine stall on deceleration; check engine light with CODES 23,25,33, or 34;

or engine speed flare on declutch operation with manual transmission equipped vehicle.

[246] Tip-in hesitation on acceleration; engine stall or sag on cold start; engine stall on deceleration; check engine light with CODES 23,25,33, or 34;

or engine speed flare on declutch operation with manual transmission equipped vehicle.

[247] Check engine light comes on while idling on vehicles equipped with Computer Controlled Emission System (C.C.E.S.), driven in altitudes above

3000 feet.

[248] Engine may stop running during parking maneuver or during coast down at low speeds during ambient temperature above 85°F.

[249] Tip-in hesitation on acceleration; engine stall or sag on cold start; engine stall on deceleration; check engine light with CODES 23,25,33, or 34;

or engine speed flare on declutch operation with manual transmission equipped vehicle.

[250] Surge on acceleration and/or at road load speeds, false "Service Engine Soon" light (CODE 32), poor driveability during warm up, Detonation

under load.

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[251] Hesitation or sag during the first two minutes of cold operation while vehicle is under moderate to heavy throttle drive away, or TCC chuggle.

[252] Cold start-stall, hesitation, or sag when the engine coolant is between 36°F to 111°F (2°C to 44°C); or Inadequate AC performance when driving

at a steady speed and throttle position, between 24 to 64 MPH, when the cruise control is not being used.

[253] Lack of throttle response on trucks equipped with governors; or hot restart driveaway sag, both governor and non-governor trucks.

[254] Intermittent stall after cold start; engine stalling on coast down; hesitation cold; or ECM CODES E22,E26,E32,E55,E70, and/or E85

[255] PROM I.D. 7080 KJ is also acceptable for PROM I.D. 5853 KJ only. Requires Throttle body service P/N 17067144, EGR valve] service P/N

17067108 (FED), 17067144 (CAL), Injector service kit P/N 17067976.

[256] Requires Throttle body service P/N 17067142, EGR valve service P/N 17067107 (FED), 17068210 (CAL), Injector service kit P/N 17067976.

[257] FOR CHUGGLE AT 40-45 CONDITION, USE PROM ONLY. FOR TIP-IN HESITATION ONLY, USE EGR VALVE ONLY - P/N

17078431. FOR COLD DRIVEABILITY HESITATION, USE BOTH PROM AND EGR.

[258] REQUIRES SUPPLEMENTARY TUNE-UP LABEL, SPARK BYPASS RELAY KIT P/N 015 14086983, SPARK PLUGS P/N 5614009, SUN

VISOR STARTING LABEL P/N 015 14085150. ALSO, REMOVE AND DISCARD FUSE LABELED "CRANK" FROM FUSE BLK #2 POSITION (3 AMP. FUSE).

[259] DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE BCC ON THE PROM TO

BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PACKAGE WITH USED SCANNER ID 5644 BUT HAD A

[260] DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE BCC ON THE PROM TO

BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PACKAGE WITH USED SCANNER ID 5644 BUT HAD A

[261] DO NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE BCC ON THE PROM TO

BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PACKAGE WITH USED SCANNER ID 5644 BUT HAD A

[262] MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY AT TEMPTED SERVICE FIXES AS FOLLOWS: EGR

VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[263] MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED SERVICE FIXES AS FOLLOWS: EGR

VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[264] MODEL 2DDM TRANS. CARS - CHECK DLR. RECORDS TO SEE IF THE TORQUE CONVERTER HAS ALREADY BEEN REPLACED

WITH PN 8650935 (BCC: DGAF). TRANSMISSIONS WITH TORQUE CONVERTERS WITH PN 8656959 (BCC: DG5F) NEED TO HAVE THE TORQUE CONVERTER REPLACED W

[265] MODEL 2DDM TRANS. CARS - CHECK DLR. RECORDS TO SEE IF THE TORQUE CONVERTER HAS ALREADY BEEN REPLACED

WITH PN 8650935 (BCC: DGAF). TRANSMISSIONS WITH TORQUE CONVERTERS WITH PN 8656959 (BCC: DG5F) NEED TO HAVE THE TORQUE CONVERTER REPLACED W

[266] Vehicles equipped with Computer Controlled Emission System (C.C.E.S) experience a Check Engine Light coming on while idling, usually when

idling time exceeds 2 minutes with transmission in gear in altitudes above 3000 feet.

[267] Cold driveability, use with PROM 5854 KJ (G057). PROM I.D. 7080 KJ IS ALSO ACCEPTABLE FOR PROM I.D. 5853 KJ ONLY.

REQUIRES THROTTLE BODY SERVICE P/N 17067144, EGR VALVE SERVICE P/N 17067108 (FED), 17067144 (CAL), INJECTOR SERVICE KIT P/N 17067976.

[268] Cold driveability, use with PROM 5853 KJ (G057). PROM I.D. 7079 KJ IS ALSO ACCEPTABLE FOR PROM I.D. 5854 KJ ONLY.

REQUIRES THROTTLE BODY SERVICE P/N 17067144, EGR VALVE SERVICE P/N 17067108 (FED), 17067144 (CAL), INJECTOR SERVICE KIT P/N 17067976.

[269] Cold driveability, use with PROM 5861 KK (G057). REQUIRES THROTTLE BODY SERVICE P/N 17067142, EGR VALVE SERVICE P/N

17067107 (FED), 17068210 (CAL), INJECTOR SERVICE KIT P/N 17067976.

[270] Cold driveability, use with PROM 5860 KK (G057). REQUIRES THROTTLE BODY SERVICE P/N 17067142, EGR VALVE SERVICE P/N

17067107 (FED), 17068210 (CAL), INJECTOR SERVICE KIT P/N 17067976.

[271] Tip-in hesitation, lack low speed performance. Used with Manual transaxle vehicles with A/C only. Requires EGR TVS P/N 373510, and A.I.R.

valve P/N 17082701.

[272] Weak drive-away after cold start, requires EGR TVS P/N 373510. Also, for CALIFORNIA emissions, manual transaxle, replace A.I.R.

management valve with PN 17082701.

[273] Level road surge, tip-in hesitation, lack of low speed performance - for automatic transaxles only. (Requires EGR valve P/N 17068212). FOR

FEDERAL - USE 01226055. FOR CALIFORNIA - USE 01226057.

[274] Stall in coast down with clutch disengaged and A/C on, weak drive away after cold start , requires EGR TVS P/N 373510. Also, for

CALIFORNIA emissions, manual transaxle, replace A.I.R. management valve with PN 17082701.

[275] Idle shake, detonation (G043). FOR 2.5L EFI, AUTOMATIC TRANSAXLE, AND FIRST DESIGN (3-BOARD) ECM. THE SECOND

DESIGN (2-BOARD) ECM HAS THE SPARK REVISION ALREADY INCORPORATED IN ITS PROM.

[276] Chuggle/surge at 40-45 MPH, tip-in hesitation/sag, spark knock, requires EGR valve (G032). FOR CHUGGLE AT 40-45 CONDITION, USE

PROM ONLY. FOR TIP-IN HESITATION ONLY, USE EGR VALVE ONLY - P/N 17078431. FOR COLD DRIVEABILITY HESITATION, USE BOTH PROM AND EGR.

[277] Chuggle and surge at 35-55 MPH, requires EGR kit. REQUIRES KIT P/N 25522748 CONTAINING: WIRING HARNESS JUMPER P/N

12043500, RELAY P/N 25522747, FOAM P/N 25522723, EGR P/N 17079799.

[278] CODE 42, spark knock, cold startability, plug fouling (G040). REQUIRES SUPPLEMENTARY TUNE-UP LABEL, SPARK BYPASS RELAY

KIT P/N 14086983, SPARK PLUGS P/N 5614009, SUN VISOR STARTING LABEL P/N 14085150. ALSO, REMOVE AND DISCARD FUSE LABELED "CRANK" FROM FUSE BLK #2 POSITION (3 AMP. FUSE).

[279] Chuggle and surge at 35-55 MPH, requires EGR kit (G040). REQUIRES KIT P/N 25522748 CONTAINING: WIRING HARNESS JUMPER

P/N 12043500, RELAY P/N 25522747, FOAM P/N 25522723, EGR P/N 17079799.

[280] Cold hesitation/sag, warm surge (G082). RETROFIT PROM SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE

USED AS BOTH THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OF DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE, DETONATION, OR FLATNESS.

[281] TCC chuggle or surge (G043). WHEN INSTALLING PROM IN A CANADIAN 1985 NB, A CODE 13 WILL OCCUR AS THE VEHICLE

WAS NOT EQUIPPED WITH AN O2 SENSOR. TO ELIMINATE THE CODE 13, NEED TO INSTALL O2 SENSOR # 8990741 AND CONNECT TO THE EXISTING PURPLE WIRE AND CONNECTOR IN THE

[282] Surge or chuggle at 52-60 MPH (G071). RETROFIT PROM - DOES NOT SUPERSEDE THE REGULAR REPLACEMENT SERVICE

PROM. TO BE USED ONLY AS REQUIRED TO RESOLVE CASES OF CHUGGLE.

[283] Surge or chuggle at 52-60 MPH (G071). RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE

USED AS BOTH THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE.

[284] Chuggle, hesitation, tip-in spark knock. RETROFIT PROM - SUPERSEDES ALL PREVIOUS SERVICE PROM PART NUMBERS. TO BE

USED AS BOTH THE REGULAR SERVICE REPLACEMENT (PROM-DAMAGED OR DEFECTIVE), AND TO RESOLVE CASES OF CHUGGLE, DETONATION, OR FLATNESS.

[285] Chuggle, hesitation, tip-in spark knock. RETROFIT PROM - DOES NOT SUPERSEDE THE REGULAR REPLACEMENT SERVICE

PROMS. TO BE USED ONLY AS REQUIRED TO RESOLVE CASES OF CHUGGLE, DETONATION, OR FLATNESS.

[286] FOR USE WITH P215/65 TIRES - USE 01228290 (SCAN I.D. = 8290). FOR USE WITH P235/60, P245/50 TIRES - USE 01228291 (SCAN

I.D. = 8291).

[287] FOR USE WITH P215/65 TIRES - USE 01228292 (SCAN I.D. = 8292). FOR USE WITH P235/60, P245/50 TIRES - USE 01228293 (SCAN

I.D. = 8293).

[288] FALSE CODES 33, 34, 43, rough idle, chuggle, hesitation (G006,G007). USED WITH VIN #119016 OR LATER ALUMINUM HEAD

CORVETTES AND ALL CONVERTIBLE MODELS WITH AUTOMATIC TRANSMISSION, 2.59 (GM1) AXLE ONLY.

[289] FALSE CODES 33, 34, 43, rough idle, chuggle, hesitation (G006,G007). USED FOR VIN #119016 OR LATER ALUMINUM HAED

CORVETTES AND ALL CONVERTIBLE MODELS WITH AUTOMATIC TRANSMISSION, 2.73 (GU2)/3.07 (G44) AXLE ONLY.

[290] Spark knock. USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER

P/N 25093526). USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[291] Spark knock. USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER

P/N 25093526). USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[292] Spark knock (G055). USE 16143575 (SCAN I.D. = 3541) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE

16143460 (SCAN I.D. = 3581) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[293] Spark knock (G043). USE 16143580 (SCAN I.D. = 3551) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE

16143462 (SCAN I.D. = 3591) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[294] Stalling, tip-in hesitation/sag, rough idle, cold driveability. USE 16143575 (SCAN I.D. = 3541) FOR HOT HARD RESTART (REQUIRES

FUEL PUMP P/N 25115764). USE 16143460 (SCAN I.D. = 3581) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[295] Hard hot restart (requires rubber bumper pkg PN 25004553, and a pulsator package PN 25094266), or CODE 42, intermittent high idle, spark

knock (G055).

[296] USE 16143575 (SCAN I.D. = 3541) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE 16143460 (SCAN I.D. =

3581) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[297] USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[298] USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[299] USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[300] Spark knock. USE 16143457 (SCAN I.D. = 3521) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER

P/N 25092778). USE 16143466 (SCAN I.D. = 3481) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

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[301] Spark knock. USE 16143452 (SCAN I.D. = 3491) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER

P/N 25092778). USE 16143463 (SCAN I.D. = 3451) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[302] Hard start hot (requires installation of a rubber bumper pkg PN 25004553, and a pulsator pkg PN 25094266) or CODE 42, high idle, spark knock

(G055).

[303] USE 16143457 (SCAN I.D. = 3521) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER P/N 25092778).

USE 16143466 (SCAN I.D. = 3481) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[304] Hard hot restart (requires rubber bumper pkg PN 25004553, and a pulsator package PN 25094266), or CODE 42, intermittent high idle, spark

knock (G055).

[305] USE 16143452 (SCAN I.D. = 3491) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER P/N 25092778).

USE 16143463 (SCAN I.D. = 3451) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[306] Tip-in hesitation,stall,CODES 23,25,33,or 34, or speed flare on declutch op. w/man. trans. (CODE 23 or 25 require MAT sensor model year

diagnostics) (G027). WITH THIS PROM INSTALLED, USE 1987-88 2.8L SPEED DENSITY ENGINE DRIVEABILITY AND EMISSIONS MANUAL.

[307] CODES 23, 25, 33, 34, driveability and stalling (G027). PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[308] Tip-in hesitation,stall,CODES 23,25,33,or 34, or speed flare on declutch op. w/man. trans. (CODE 23 or 25 require MAT sensor model year

diagnostics). PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[309] Code 23, 25, 33, 34, driveability and stalling. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY

SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[310] Tip-in hesitation,stall,CODES 23,25,33,or 34, or speed flare on declutch op. w/man. trans. (CODE 23 or 25 require MAT sensor model year

diagnostics) (G027). PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[311] High emissions, exhaust odor, starting and driveability problems (G046). Requires Connector Bleed Assembly P/N 10105820

[312] FALSE CODES 43, 54, unstable idle. FOR 2.73 (GU2) AXLE USE 16120077 (SCAN I.D. = 9891). FOR 3.08 (GU4) AXLE USE 16120082

(SCAN I.D. = 9901). FOR 3.42 (GU6) AND 3.73 (GT4) AXLES USE 16120086 (SCAN I.D. = 9911).

[313] Running change. FOR FALSE CODE 44 ON LONG COAST DOWN, USE RETROFIT SERVICE PROM 01228486 SCAN I.D. 8486, AAND

1050. FOR REGULAR SERVICE REPLACEMENT, USE PROM 16062797 SCAN I.D. 2223, AAND 2798.

[314] Running change. FOR FALSE CODE 44 ON LONG COAST DOWN, USE RETROFIT SERVICE PROM 01228487 SCAN I.D. 8487, AANF

1052. FOR REGULAR SERVICE REPLACEMENT, USE PROM 16062801 SCAN I.D. 2233, AANF 2802.

[315] Surge on acceleration and/or at road load speeds, false "Service Engine Soon" light (CODE 32), poor driveability during warm up, Detonation

under load (G052).

[316] Spark knock. USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER

P/N 25093526). USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[317] Spark knock. USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER

P/N 25093526). USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[318] Spark knock (G043). USE 16143580 (SCAN I.D. = 3551) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764). USE

16143462 (SCAN I.D. = 3591) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[319] Spark knock (G055). USE 16143545 (SCAN I.D. = 3461) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL

SENDER P/N 25093744). USE 16143465 (SCAN I.D. = 3471) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[320] CODE 42, spark knock, intermittent high idle. IF MAJOR CONDITION IS HARD HOT ENGINE RESTART, PROM ALSO REQUIRES

INSTALLATION OF A RUBBER BUMPER PKG PN 25004553, AND PULSATOR PKG PN 25094266.

[321] USE 16143545 (SCAN I.D. = 3461) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093744).

USE 16143465 (SCAN I.D. = 3471) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[322] USE 16143570 (SCAN I.D. = 3531) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143459 (SCAN I.D. = 3571) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[323] USE 16143455 (SCAN I.D. = 3511) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115764, FUEL SENDER P/N 25093526).

USE 16143453 (SCAN I.D. = 3501) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[324] Spark knock. USE 16143457 (SCAN I.D. = 3521) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER

P/N 25092778). USE 16143466 (SCAN I.D. = 3481) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[325] Spark knock. USE 16143452 (SCAN I.D. = 3491) FOR HOT HARD RESTART (REQUIRES FUEL PUMP P/N 25115925, FUEL SENDER

P/N 25092778). USE 16143463 (SCAN I.D. = 3451) FOR CODE 42, SPARK KNOCK, HIGH IDLE.

[326] Tip-in hesitation, stall, CODES 23, 25, 33, or 34, or speed flare on declutch op. w/man. trans. (CODE 23 or 25 require MAT sensor model year

diagnostics) (G027). WITH THIS PROM INSTALLED, USE 1987-88 2.8L SPEED DENSITY ENGINE DRIVEABILITY AND EMISSIONS MANUAL.

[327] CODES 23, 25, 33, 34. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A

1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[328] Tip-in hesitation,stall,CODES 23,25,33,or 34, or speed flare on declutch op. w/ man. trans. (CODE 23 or 25 require MAT sensor model year

diagnostics). PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[329] Tip-in hesitation,stall,CODES 23,25,33,or 34, or speed flare on declutch op. w/ man. trans. (CODE 23 or 25 require MAT sensor model year

diagnostics) (G027). PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[330] CODES 23, 25, 33, 34, driveability and stalling (G027). PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED

DENSITY SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[331] Code 23, 25, 33, 34, driveability and stalling. PROM UPDATE ELIMINATES MAF SENSOR, REPLACING IT WITH A SPEED DENSITY

SYSTEM. WITH A 1990 OR EARLIER PRIMARY CARTRIDGE, I.D. VEHICLE ON SCANNER AS A 1989 MODEL (VIN = K-1-W).

[332] FOR USE WITH MODEL C1 TRUCKS - USE 16121162 (SCAN I.D. = 3511). FOR USE WITH MODEL C2, K, K2, AND K1000 TRUCKS -

USE 16121166 (SCAN I.D. = 3521).

[333] Surge on acceleration and/or at road load speeds, false "Service Engine Soon" light (CODE 32), poor driveability during warm up, Detonation

under load (G052).

[334] Cold engine extended crank. USE 16181863 (SCAN I.D. = 0844) FOR COLD START STALL. USE 16181859 (SCAN I.D. = 0834) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[335] [Cold engine extended crank. USE 16181871 (SCAN I.D. = 0864) FOR COLD START STALL. USE 16181867 (SCAN I.D. = 0854) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[336] Engine does not stay running on initial cold start and chuggle at 35-45 MPH with TCC engaged. New MEM-CAL may affect fuel economy. DO

NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PACKAGE WITH SCANNER ID 5644 BUT A BCC OF A]

[337] Cold engine extended crank. USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[338] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[339] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[340] Cold engine extended crank. USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[341] Hesitation or sag during the first two minutes of cold operation while vehicle is under moderate to heavy throttle driveaway, or TCC chuggle.

[342] Cold start-stall, hesitation, or sag when the engine coolant is between 36°F - 111°F (2°C - 44°C); or Inadequate A/C performance when driving at

steady speed and throttle position, between 24 - 64 MPH, when the cruise control is not being used.

[343] Engine does not stay running on initial cold start and chuggle at 35-45 MPH with TCC engaged. New MEM-CAL may affect fuel economy. DO

NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PACKAGE WITH SCANNER ID 5644 BUT A BCC OF A

[344] Cold engine extended crank. USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[345] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[346] Cold engine extended crank. USE 16181883 (SCAN I.D. = 0894) FOR COLD START STALL. USE 16181875 (SCAN I.D. = 0874) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[347] Cold engine extended crank. USE 16181887 (SCAN I.D. = 0904) FOR COLD START STALL. USE 16181879 (SCAN I.D. = 0884) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[348] Service Engine Soon light (SES) with a code 43 or tip-in sag, tip-in hesitation, surge at WOT, or spark detonation when cold.

[349] Engine stall. MANUAL TRANSMISSION CARS SHOULD ALSO BE UPDATED WITH THE CLUTCH ANTICIPATE SWITCH PER

DEALER SERVICE BULLETIN NO. 91-472-7C.

[350] Engine does not stay running on initial cold start and chuggle at 35-45 MPH with TCC engaged. New MEM-CAL may affect fuel economy. DO

NOT RELY ON THE SCANNER ID TO DETERMINE WHICH PROM IS IN A VEHICLE. LOOK AT THE BCC ON THE PROM TO BE SURE. DO NOT CONFUSE WITH SOME 1991 MODELS WITH A 2.84 AXLE RATIO AND A FEDERAL EMISSIONS PACKAGE WITH SCANNER ID 5644 BUT A BCC OF A.

PROM - Programmable Read Only Memory: Application and ID Footnotes 351 Thru 400

[351] USE 16165848 (SCAN I.D. = 5614) FOR COLD START STALL. USE 16165843 (SCAN I.D. = 5624) ONLY IF REQUIRED TO SOLVE

BOTH COLD START STALL AND CHUGGLE.

[352] USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF REQUIRED TO SOLVE

BOTH COLD START STALL AND CHUGGLE.

[353] Cold engine extended crank. USE 16165839 (SCAN I.D. = 5634) FOR COLD START STALL. USE 16165829 (SCAN I.D. = 5644) ONLY IF

REQUIRED TO SOLVE BOTH COLD START STALL AND CHUGGLE.

[354] Lack of throttle response on trucks equipped with governors; or hot restart driveaway sag, both governor and non-governor trucks.

[355] Low speed driveability or detonation. MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED

SERVICE FIXES AS FOLLOWS: EGR VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[356] Tip-in hesitation, sag, backfire, spark knock. MAKE CERTAIN THE VEHICLE HAS BEEN UPDATED WITH PREVIOUSLY ATTEMPTED

SERVICE FIXES AS FOLLOWS: EGR VALVE P/N 17090156 (STAMPED ON VALVE) 17112373 (GMSPO KIT), PCV VALVE P/N 25098542, ESC MODULE P/N 16175099 (BCC=BARC).

[357] Hesitation or sag during the first two minutes of cold operation while vehicle is under moderate to heavy throttle driveaway, or TCC chuggle.

[358] Sustained detonation/knock. AUTOMATIC TRANSMISSIONS REQUIRE TORQUE CONVERTER CLUTCH (TCC) CALIBRATION. USE

OF THIS PROM IN A NON-DETONATING ENGINE MAY RESULT IN DEGRADED DRIVEABILITY.

[359] High emissions, exhaust odor, starting and driveability problems (G046). Requires Connector Bleed Assembly P/N 10105820

[360] Neutral gear rattle. MAY ALSO REQUIRE CLUTCH DRIVEN PLATE P/N 15961141, AND CLUTCH PILOT BEARING P/N 14061685.

COMBINATION DETONATION AND NEUTRAL GEAR RATTLE PROM AVAILABLE.

[361] Malfunction Indicator Lamp (check engine light) illuminates and may set a DTC 24 (VSS Circuit Fault) during a California State Emissions Test.

[362] Higher than normal hydrocarbon emissions during the idle portion of the inspection and maintenance test. Also, may exhibit a slight detonation

during a light throttle acceleration

[363] TCC chuggle. MODEL 2DDM TRANS. - CHECK DEALER RECORDS TO SEE IF THE TORQUE CONVERTER HAS BEEN REPLACED

WITH P/N 8650935 (BCC: DGAF). TRANS. WITH TORQUE CONVERTERS WITH P/N 8656959 (BCC: DG5F) NEED TO HAVE THE TORQUE CONVERTER REPLACED WITH P/N 8650935.

[364] Cold start stall, cold tip in hesitation and/or a cold rough idle after extended idling. Additionally, in 40-50°F ambient temp., fogging on the

inside of the front windshield which does not clear with the defroster on occurs.

[365] Poor throttle response, stall, misfire, poor cold or hot start, extended crank of the starter with a hot engine, and/or vehicle will start and then stall

when the engine is hot. MT vehicles may also experience decel. stall and poor accel. performance.

[366] Poor throttle response, stalling, misfire, poor cold or hot starting, extended cranking of the starter with a hot engine, and/or vehicle will start and

then stall when the engine is hot. USED WITH MANUAL TRANSMISSION ONLY.

[367] MIL illuminates and/or store a DTC 32 (EGR error) with no noticeable driveability concern, usually occurring while climbing a grade.

[368] MIL illuminates and/or store a DTC 32 (EGR error) with no noticeable driveability concern, usually occurring while climbing a grade, towing a

trailer or driving into a strong head wind.

[369] High emissions, exhaust odor, starting and driveability problems (G046). Requires Connector Bleed Assembly P/N 10105820

Prom Information

Scan Prom Prom Prom Superseding

ID Code Bcc Part # ID Part # TSB Reference #

6741 3988 CRD 16043987

8141 7911 BFR 16037910

PROM - Programmable Read Only Memory: Description and Operation CALPAK

CAUTION:

If the computer is found to be defective and needs replacement, remove the old CALPAK and PROM, then place both into the replacement computer. When replacing the COMPUTER always transfer the BROADCAST CODE and PRODUCTION ECM/PCM NUMBER to the service label on the replacement computer.

DESCRIPTION:

The resistor network calibration called a CALPAK is located inside the computer. Its appearance and service is similar to the PROM. The CALPAK allows fuel to be delivered if other parts of the computer fail. The CALPAK provides the computer with calibrations for:

^ Cold Start Cranking.

^ Limp home fuel (fuel backup mode).

PROM - Programmable Read Only Memory: Description and Operation EEPROM

CAUTION:

The EEPROM is soldered to the COMPUTER and cannot be serviced separately. Reprogramming of EEPROM information is necessary when replacing a COMPUTER, or when changing the engine and/or transaxle calibrations. Failure to do this will cause the vehicle to have a no start or poor running condition.

It is essential that a replacement COMPUTER be reprogrammed with the correct VIN, option content, tire size, and calibration information. Reprogramming of the EEPROM is only possible with the Service Stall System (SSS) hardware available at authorized dealer locations. Check with a dealer before performing COMPUTER replacement or EEPROM reprogramming.

DESCRIPTION:

The term EEPROM is defined as Electronically Erasable Programmable Read Only Memory (EEPROM) in the COMPUTER. The EEPROM stores vehicle information such as engine and transaxle calibrations, vehicle identification number, programmable vehicle option content and MALF history. Vehicle information stored on the EEPROM has a major effect on how the vehicle will operate.

PROM - Programmable Read Only Memory: Description and Operation EPROM

CAUTION:

The EPROM is serviceable in some applications and can be removed for replacement. If the COMPUTER is found to be defective and needs replacement, remove the old EPROM if applicable and place into the new computer. When replacing the COMPUTER always transfer the BROADCAST CODE and PRODUCTION ECM/PCM NUMBER to the service label on the replacement computer.

DESCRIPTION:

The term EPROM means Erasable Programmable Read Only Memory (EPROM). The EPROM functions in the same manner as a regular PROM and is programmed with data pertaining to the vehicles weight, engine, transmission, axle ratio etc. Automotive technicians do not ERASE or PROGRAM the EPROM in the field. Instead, the EPROM is serviced in one of two manners. Some applications are soldered to the circuit board and require both the computer and EPROM to be replaced as a complete unit. Other applications allow for the EPROM only to replaced.

PROM - Programmable Read Only Memory: Description and Operation MEMCAL

CAUTION:

If the COMPUTER is found to be defective and needs replacement, remove the old MEMCAL and place it into the replacement computer. When replacing the COMPUTER always transfer the BROADCAST CODE and PRODUCTION ECM/PCM NUMBER to the service label on the replacement computer.

DESCRIPTION:

The MEMCAL assembly contains both the functions of the PROM and the CALPAK. Like the PROM, it contains the calibrations needed for a specific vehicle. It also is the fuel back up control for the computer should it become damaged or faulty.

PROM - Programmable Read Only Memory: Description and Operation PROM

CAUTION:

If the computer is found to be defective and needs replacement, remove the old PROM and place it into the replacement computer. Some ECM's are equipped with another chip called a CALPAK. If the computer is equipped with a CALPAK chip, it will be located next to the PROM and must be transferred along with the PROM. When replacing the computer always transfer the BROADCAST CODE and PRODUCTION ECM/PCM NUMBER to the service label on the replacement computer.

DESCRIPTION:

To allow one type of computer to be used for many different vehicles, a device called a Programable Read Only Memory (PROM) unit is used. The PROM is located inside the computer and has system calibration information based upon the vehicle's axle ratio, engine, transmission, weight, and other specific configurations of the vehicle.

PROM - Programmable Read Only Memory: Testing and Inspection

Some control modules may have problems due to cracked solder joints on the circuit board. These internal control module problems can cause the following symptoms:

^ Failure to start or vehicle is stalling.

^ The "CHECK ENGINE" "SERVICE ENGINE SOON" or "MALFUNCTION INDICATOR" light will flash or light up, but no trouble codes will be present.

^ Vehicle instrument panel displays may be inoperative.

^ The control module may or may not communicate with the scanner.

^ Other intermittent driveability problems.

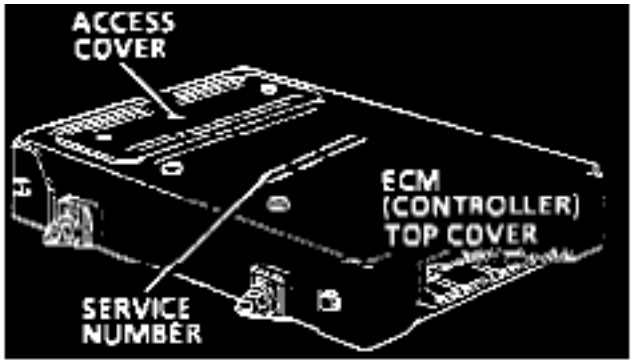
Incorrect PROM or MEMCAL removal and replacement can create solder joint problems or aggravate an existing condition. See PROM or MEMCAL INSTALLATION for proper procedures.

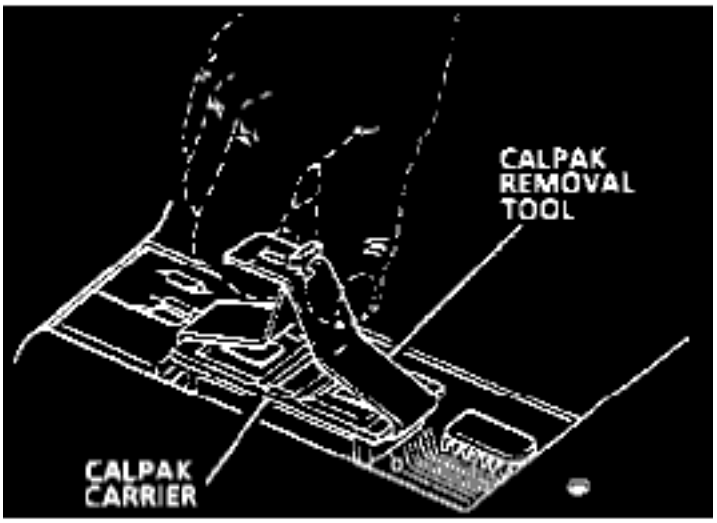
If a solder joint problem results in a "hard" failure, normal test procedures will usually pinpoint a faulty control module. Many symptoms caused by poor solder joints in the control module result in intermittent problems, but they may be hard to duplicate during troubleshooting. Control modules with solder joint problems are sensitive to heat and vibration. You can check for these internal control module problems in either, or both, of the following ways:

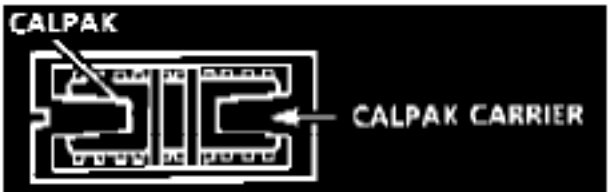
^ Remove the control module from its mounting bracket and extend it on the harness so that you can expose it to the vehicle heater ducts. Alternatively, use the flexible duct to route air from the heater to the control module location. Then run the engine and operate the heater at the "MAX HEAT" position. This exposes the control module to approximately 140°F.

^ With the engine running, tap on the control module several times with your hand or finger tips to simulate vehicle vibration.

If the engine stumbles or stalls, the "CHECK ENGINE" "SERVICE ENGINE SOON" or "MALFUNCTION INDICATOR" light flashes, or any of the previous symptoms occur, the control module may have bad solder joints on the circuit board.







PROM - Programmable Read Only Memory: Service and Repair CALPAK

1. Remove ECM from vehicle.

2. Remove ECM access cover.

3. Remove Calibration Pack (CALPAK) using removal tool shown. Grasp the CALPAK carrier on the narrow ends only. Gently rock the carrier from

end to end while applying a firm upward force.

4. Inspect the reference end of the CALPAK carrier and carefully set aside. Do not remove the CALPAK from the carrier to confirm CALPAK

correctness. The notch in the CALPAK is referenced to the small notch in the carrier. The small notch of the carrier must be aligned with the small notch in the socket.

CAUTION: ANY TIME THE CALPAK IS INSTALLED BACKWARDS AND THE IGNITION SWITCH IS TURNED ON, THE CALPAK IS DESTROYED.

5. Install the CALPACK by pressing on the CALPAK carrier until it is firmly seated in the socket. Do not press on the CALPAK, only the carrier.

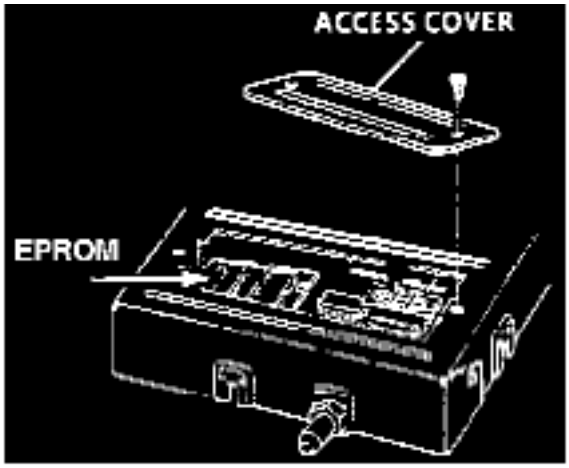
6. Install ECM access cover.

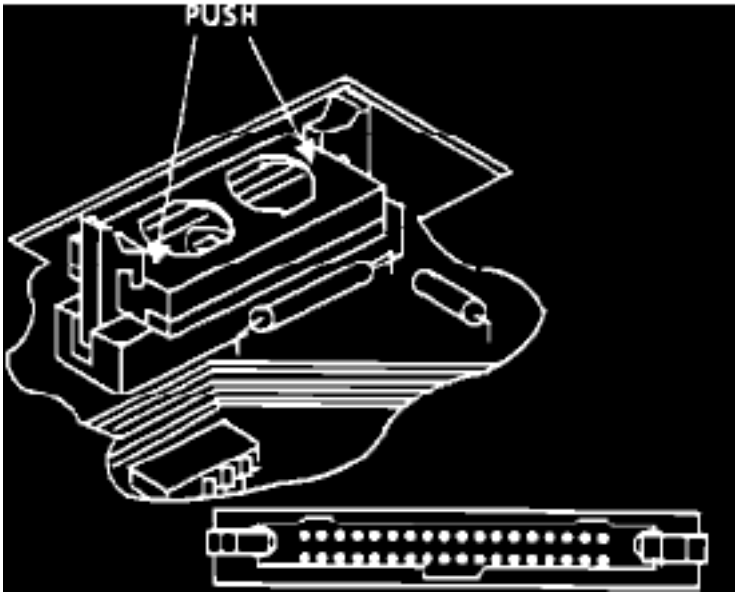
7. Install ECM and perform a DIAGNOSTIC CIRCUIT CHECK to confirm proper installation.

PROM - Programmable Read Only Memory: Service and Repair EEPROM

CAUTION:

The Erasable Programmable Read Only Memory (EEPROM) is a permanent memory that is physically soldered to the circuit boards within the computer. It is not serviceable and should not be removed for replacement. If COMPUTER replacement is performed, reprogramming of the EEPROM will be necessary. Failure to do this will cause the vehicle to have a no start or poor running condition. Reprogramming of the EEPROM is only possible with the Service Stall System (SSS) hardware available at authorized dealer locations. Check with a dealer before performing COMPUTER replacement or EEPROM reprogramming.





PROM - Programmable Read Only Memory: Service and Repair EPROM

REMOVAL:

^ DO NOT remove an EPROM from its packing material until you are ready to install it. DO NOT hold an EPROM by its pins.

^ Before entering a vehicle to remove or replace an EPROM, touch an exposed metal part of the vehicle to discharge any static charge from your body or use anti-static wrist straps. Avoid sliding

across upholstery or carpeting when removing or installing an EPROM. If this is not possible, touch an exposed metal part of the vehicle with your free hand before removing or replacing an EPROM.

^ When available, use an antistatic grounding strap attached to your wrist and clipped to a metal part of the vehicle body to prevent static charges from accumulating. Antistatic conductive floormats are also available.

^ It may be desirable to remove the computer for EPROM replacement.

^ Remove computer access cover.

^ Unlock the locking levers by pressing outward toward the sides of the EPROM.

^ Remove EPROM from its socket

INSTALLATION:

EPROM/MEM-CAL Unit Installation

^ Install the replacement EPROM in the same direction.

^ VERY GENTLY PRESS down on the ends of the EPROM until the locking levers are rotated toward the sides of the EPROM.

^ NOTE: To avoid Computer damage, do not press on the ends of the EPROM until the levers snap into place. Do not use any vertical force beyond the minimum required to engage the EPROM into its socket.

^ While continuing light pressure on the ends of the EPROM, use your index fingers to press the locking levers inward until they are snapped into place. Listen for the click.

^ Install the access cover on the computer.

^ Perform FUNCTIONAL CHECK

PROM - Programmable Read Only Memory: Service and Repair MEMCAL

*** UPDATED BY TSB #91-318-6E DATED MAY 1991

CONDITION:

When installing a service replacement computer, the use of incorrect MEMCAL installation procedures may cause the computer to fail before it can be installed in the vehicle. This condition may appear as if the computer were defective when shipped to the dealership, when in fact it was damaged while being installed. In addition this condition may also occur when installing an updated MEMCAL into the vehicles original equipment computer.

CAUSE:

Excessive vertical force may be applied to the MEMCAL resulting in flexing of the circuit board and damage to the connections between the circuit board and attached components. Excessive vertical force may be generated in two ways.

^ Incorrect MEMCAL installation procedures.

^ Interference between MEMCAL and cover.

IMPORTANT CORRECTION:

This procedure supersedes any instructions regarding MEMCAL installation dated prior to September 1990.

1. Inspect the MEMCAL to determine if a cork spacer is glued to the top side of the MEMCAL assembly. If so, remove it prior to installation.

2. Align small notches with matching notches in Computer MEMCAL socket.

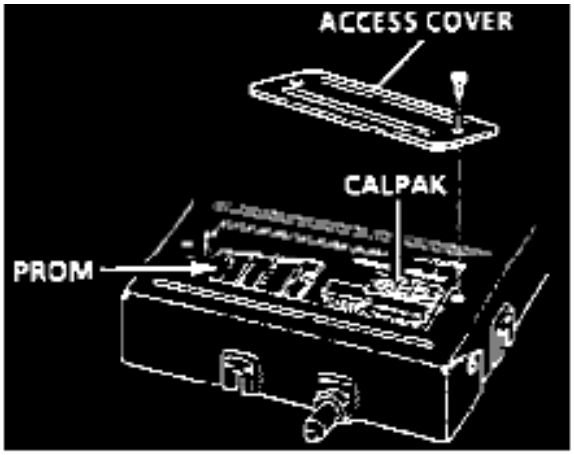
3. VERY GENTLY PRESS down on the ends of the MEMCAL until the locking levers are rotated toward the sides of the MEMCAL.

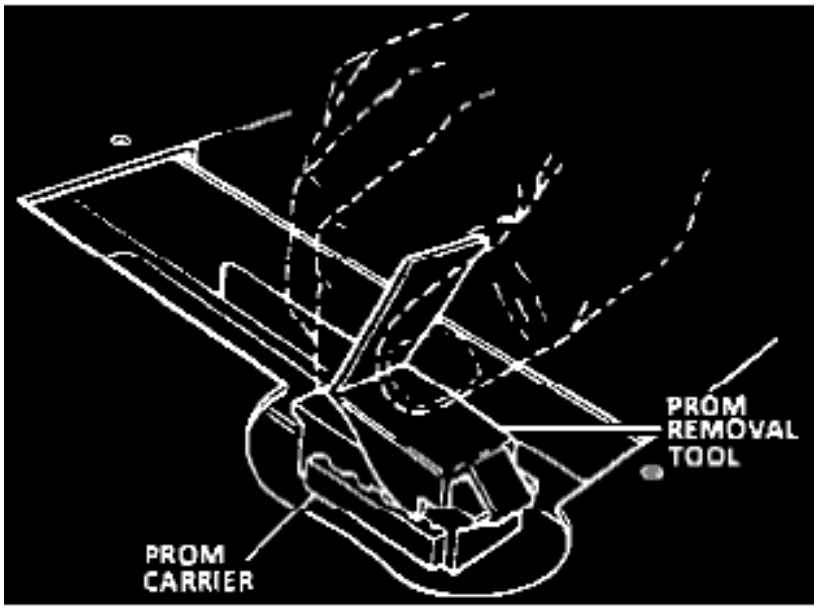
NOTE: To avoid Computer damage, do not press on the ends of the MEMCAL until the levers snap into place. Do not use any vertical force beyond the minimum required to engage the MEMCAL into its socket.

4. While continuing light pressure on the ends of the MEMCAL, use your index fingers to press the locking levers inward until they are snapped into

place. Listen for the click.

5. Install MEMCAL cover and install Computer cover.


ACCESS COVER
CALPAK
PROM


PROM
REMOVAL
TOOL
PROM
CARRIER

PROM
PROM CARRIER

PROM - Programmable Read Only Memory: Service and Repair PROM

1. Remove ECM from vehicle.

2. Remove ECM access cover.

PROM Removal

3. Remove PROM using the rocker-type PROM removal tool shown. Engage one end of the PROM carrier with the hook end of the tool. Press on

the vertical bar end of the tool and rock the engaged end of the PROM carrier up as far as possible. Engage the opposite end of the PROM carrier in the same manner and rock this end up as far as possible. Repeat this process until the PROM carrier and PROM are free of the PROM socket. The PROM carrier with the PROM in it should lift off of the PROM socket easily.

4. Inspect the reference end of the PROM carrier and carefully set aside. Do not remove the PROM from the carrier to confirm PROM correctness.

The notch in the PROM is referenced to the small notch in the carrier. The small notch of the carrier must be aligned with the small notch in the socket.

CAUTION: ANY TIME THE PROM IS INSTALLED BACKWARDS AND THE IGNITION SWITCH IS TURNED ON, THE PROM IS DESTROYED.

5. Install PROM by pressing on the PROM carrier until it is firmly seated in the socket. Do not press on the PROM, only the carrier.

6. Install ECM access cover.

7. Install ECM and perform a DIAGNOSTIC CIRCUIT CHECK to confirm proper installation.

Shift Solenoid: Description and Operation Upshift Solenoid

1-2 Shift Valve

Controls the speed at which the 1-2 and 2-1 shifts occur.

2-3 Shift Valve

Controls speeds at which 2-3 and 3-2 shifts occur.

Stator Valve

Used only on transmissions having the variable pitch stator, this valve shifts when line oil is exhausted at end of valve when stator control solenoid is energized. This exhausts oil from the variable pitch stator piston and changes from the low to the high angle. When the stator solenoid is not energized, converter oil is directed to the stator piston and low angle is obtained.

Shift Solenoid: Description and Operation Shift Solenoid

DESCRIPTION

The detent solenoid is activated by an electric switch at the carburetor. When the throttle is opened sufficiently to close this switch, the solenoid in the transmission is activated, causing a downshift at speeds below 70 mph. it lower speeds, downshifts will occur at lesser throttle openings without the use of the electric switch.

1-2 Detent Valve

Senses regulated modulator pressure tending to hold 1-2 shift valve downshifted and provides an area for detent pressure for detent 2-1 shifts.

Detent Valve

Shifts when oil line is exhausted at end of valve when detent solenoid is energized. This directs detent oil to the 1-2 accumulator valve, 1-2 regulator and 2-3 modulator valves, 3-2 valve and the vacuum modulator valve.

Detent Regulator Valve

When the detent valve shifts, the detent regulator is free to allow drive oil to enter the detent passage and thus becomes regulated at 70 psi. Detent pressure will also flow into the mod lator passage which flows to the shift valves. Low gear oil moves the detent regulator open to drive oil, allowing drive oil to enter modulator and detent passages.

Shift Solenoid: Description and Operation Upshift Solenoid

1-2 Shift Valve

Controls the speed at which the 1-2 and 2-1 shifts occur.

2-3 Shift Valve

Controls speeds at which 2-3 and 3-2 shifts occur.

Stator Valve

Used only on transmissions having the variable pitch stator, this valve shifts when line oil is exhausted at end of valve when stator control solenoid is energized. This exhausts oil from the variable pitch stator piston and changes from the low to the high angle. When the stator solenoid is not energized, converter oil is directed to the stator piston and low angle is obtained.

Shift Solenoid: Description and Operation Shift Solenoid

DESCRIPTION

The detent solenoid is activated by an electric switch at the carburetor. When the throttle is opened sufficiently to close this switch, the solenoid in the transmission is activated, causing a downshift at speeds below 70 mph. it lower speeds, downshifts will occur at lesser throttle openings without the use of the electric switch.

1-2 Detent Valve

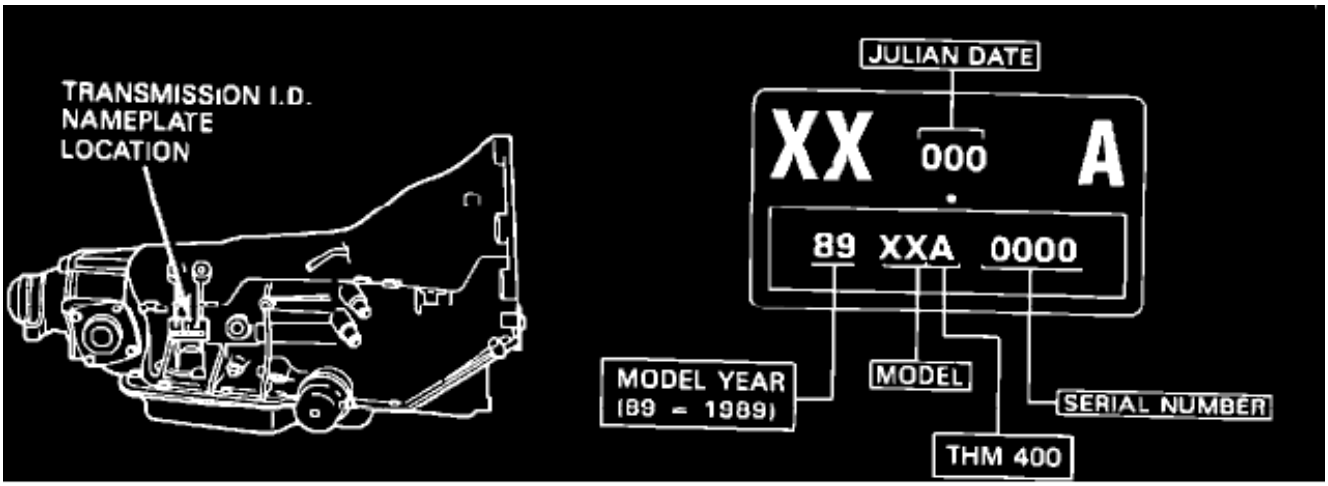
Senses regulated modulator pressure tending to hold 1-2 shift valve downshifted and provides an area for detent pressure for detent 2-1 shifts.

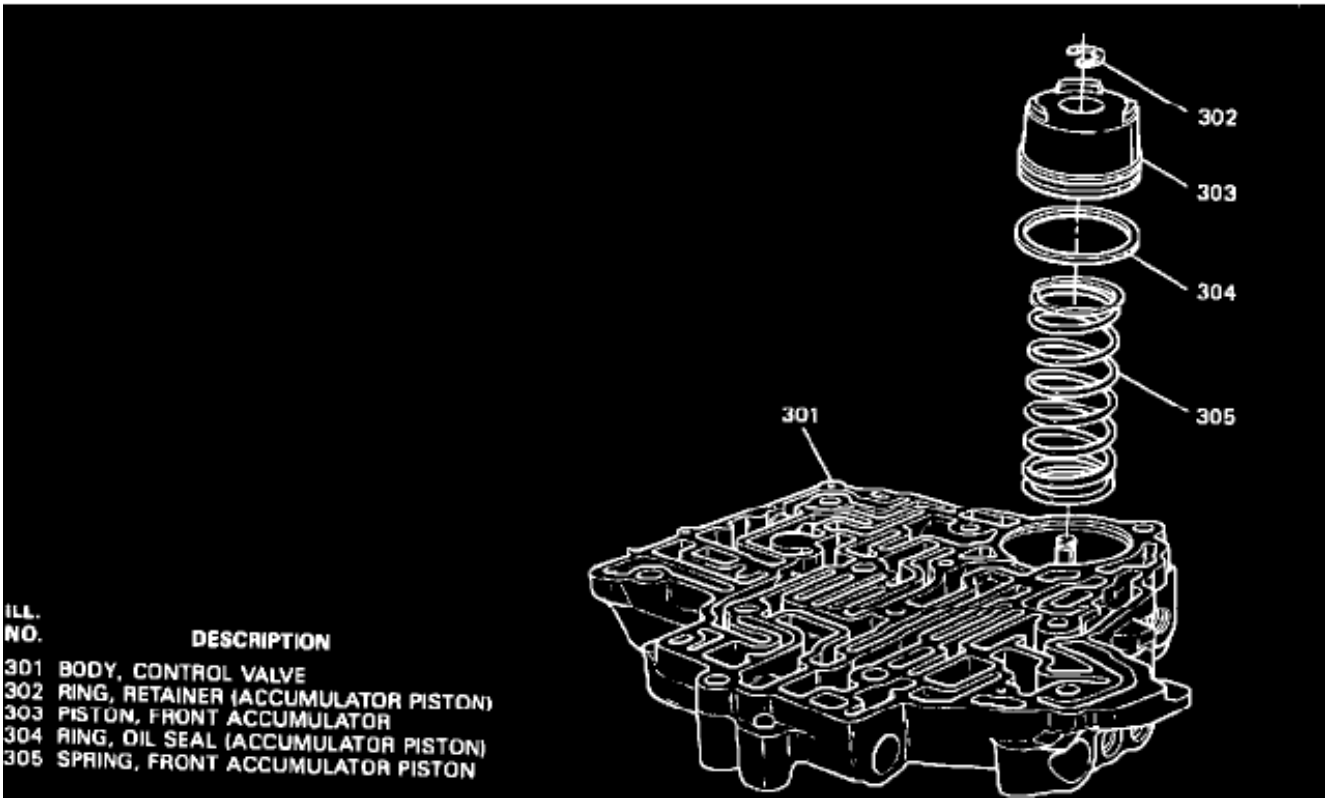
Detent Valve

Shifts when oil line is exhausted at end of valve when detent solenoid is energized. This directs detent oil to the 1-2 accumulator valve, 1-2 regulator and 2-3 modulator valves, 3-2 valve and the vacuum modulator valve.

Detent Regulator Valve

When the detent valve shifts, the detent regulator is free to allow drive oil to enter the detent passage and thus becomes regulated at 70 psi. Detent pressure will also flow into the mod lator passage which flows to the shift valves. Low gear oil moves the detent regulator open to drive oil, allowing drive oil to enter modulator and detent passages.





Accumulator: Customer Interest A/T - No Engine Braking In Drive 2 (D2)

Number: 88-378-7A

Section: 7A

Date: DEC., 1988

Subject: NO ENGINE BRAKING IN DRIVE 2 (D2)

Model and Year: 1978-88 TRUCKS WITH THM 400/475

FIGURE 1 - THM 400/475, HYDRA-MATIC 3L80/3L80-HD TRANSMISSION IDENTIFICATION INFORMATION

FIGURE 2 - VALVE BODY

TO: ALL CHEVROLET DEALERS

This bulletin covers no engine braking in Drive 2 (D2) selector range caused by a broken plastic Front Accumulator Piston (303). The transmissions affected are the THM 400/475/ HYDRA-MATIC 3L80/3L80-HD Transmission. The die cast aluminum piston can be used in service for this condition and will reduce the chance of any broken or cracked pistons.

DATE OF PRODUCTION CHANGE: (Figure 1)

August 1, 1988 (Julian Date 214) all 1989 THM 400/475/ HYDRA-MATIC 3L80/3L80-HD Transmissions were built with the aluminum Front Accumulator Piston (303).

SERVICE PARTS INFORMATION: (Figure 2)

Service Part No. Part Description

8626883 Piston-Front Accumulator (303)

This part is currently available from GMSPO.

IMPORTANT: The plastic Front Accumulator Piston (8629080) should be replaced if found in any 1978-88 Control Valve Assembly (049).

SERVICE MANUAL REFERENCE:

Refer to the Unit Repair Section of the appropriate Service Manual for proper replacement procedure.

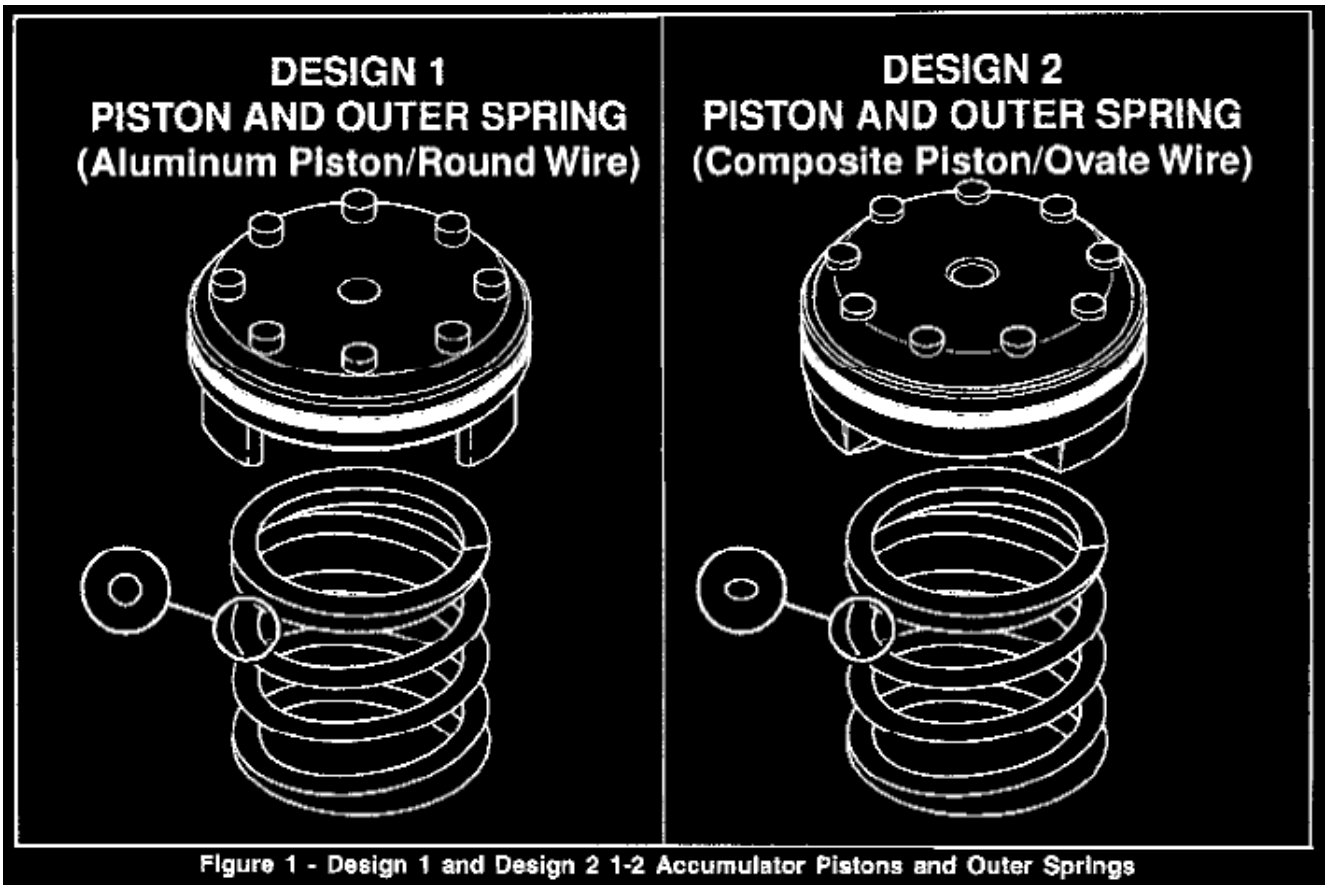


Figure 1 - Design 1 and Design 2 1-2 Accumulator Pistons and Outer Springs

Accumulator: All Technical Service Bulletins A/T - 1-2 Accumulator Piston/Outer Spring Replacement

File In Section: 7 - Transmission

Bulletin No.: 87-71-74

Date: November, 1998

INFORMATION

Subject: 1-2 Accumulator Piston and Outer Spring Replacement

Models: 1982-96 Buick Roadmaster 1982-96 Cadillac Brougham, Fleetwood, DeVille 1982-86 Chevrolet Caprice 1982-99 Chevrolet Camaro, Corvette 1982-99 Pontiac Firebird with HYDRA-MATIC 4L60, 4L60-E Transmission (RPOs MD8, M30)

1982-99 Chevrolet and GMC C/K, M/L, S/T, G Models 1991-99 Oldsmobile Bravada with HYDRA-MATIC 4L60, 4L60-E Transmission (RPOs MD8, M30)

Transmissions built from 1982 through 1999 were built with one of two styles of 1-2 accumulator pistons and outer springs.

Important:

The 1-2 accumulator pistons and outer springs are not interchangeable.

For replacement of the 1-2 accumulator piston and outer spring, remove the 1-2 accumulator assembly and inspect the interior for the presence of either an aluminum or composite (plastic) 1-2 accumulator piston.

Design 1

1-2 accumulator assemblies with an aluminum piston and a round wire outer spring, use service package P/N 24204495 (1982-1993) or P/N 24204496

(1994-1997).

Design 2

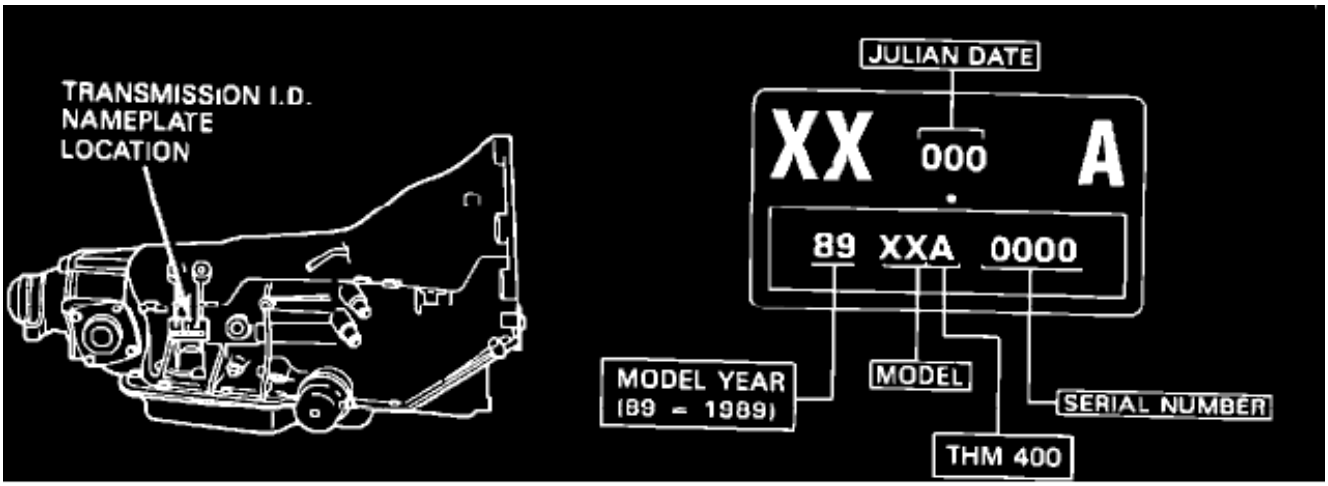
1-2 accumulator assemblies with a composite (plastic) piston and an ovate wire outer spring, started May 11, 1998 (Julian Date 131), use service package P/N 24214343 (1998-1999).

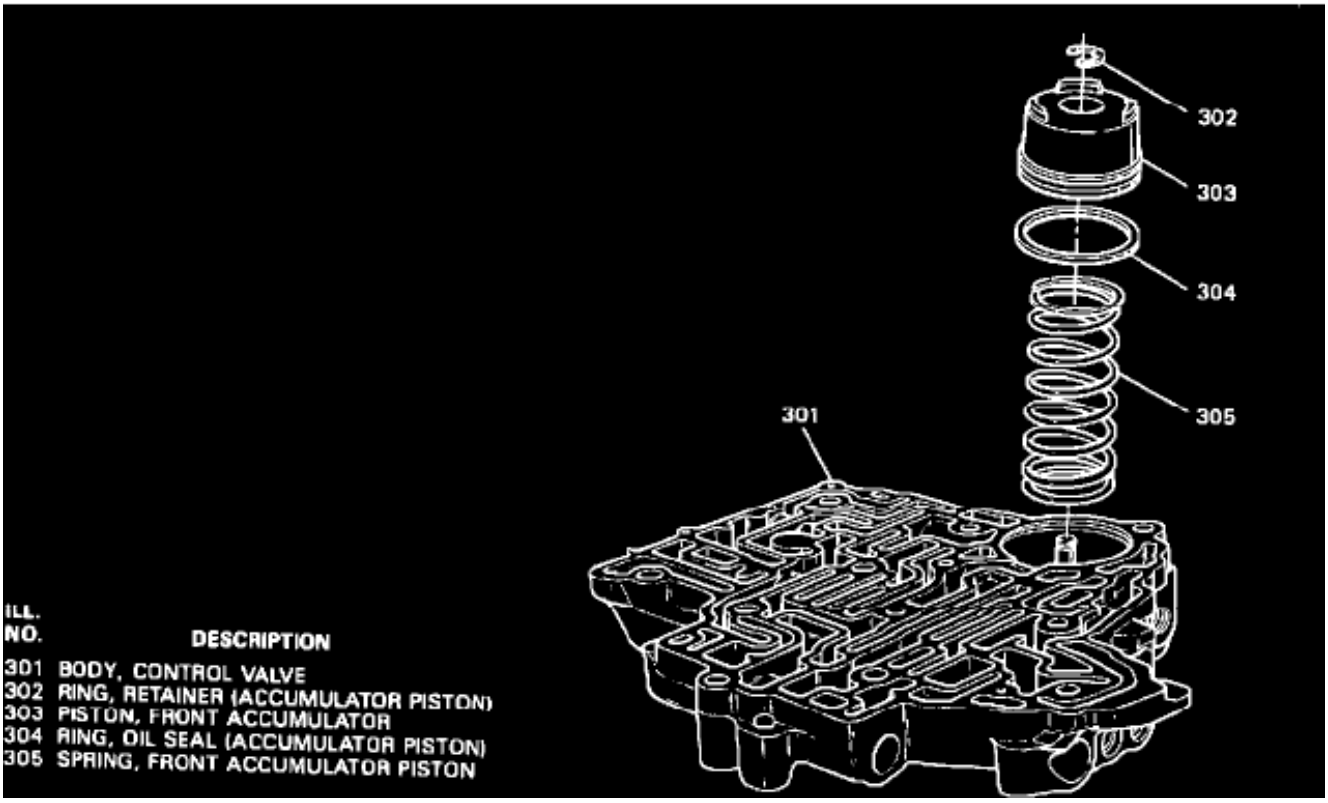
Notice:

Failure to follow the above instructions may result in transmission distress.

Parts Information

Parts are currently available from GMSPO.





Accumulator: All Technical Service Bulletins A/T - No Engine Braking In Drive 2 (D2)

Number: 88-378-7A

Section: 7A

Date: DEC., 1988

Subject: NO ENGINE BRAKING IN DRIVE 2 (D2)

Model and Year: 1978-88 TRUCKS WITH THM 400/475

FIGURE 1 - THM 400/475, HYDRA-MATIC 3L80/3L80-HD TRANSMISSION IDENTIFICATION INFORMATION

FIGURE 2 - VALVE BODY

TO: ALL CHEVROLET DEALERS

This bulletin covers no engine braking in Drive 2 (D2) selector range caused by a broken plastic Front Accumulator Piston (303). The transmissions affected are the THM 400/475/ HYDRA-MATIC 3L80/3L80-HD Transmission. The die cast aluminum piston can be used in service for this condition and will reduce the chance of any broken or cracked pistons.

DATE OF PRODUCTION CHANGE: (Figure 1)

August 1, 1988 (Julian Date 214) all 1989 THM 400/475/ HYDRA-MATIC 3L80/3L80-HD Transmissions were built with the aluminum Front Accumulator Piston (303).

SERVICE PARTS INFORMATION: (Figure 2)

Service Part No. Part Description

8626883 Piston-Front Accumulator (303)

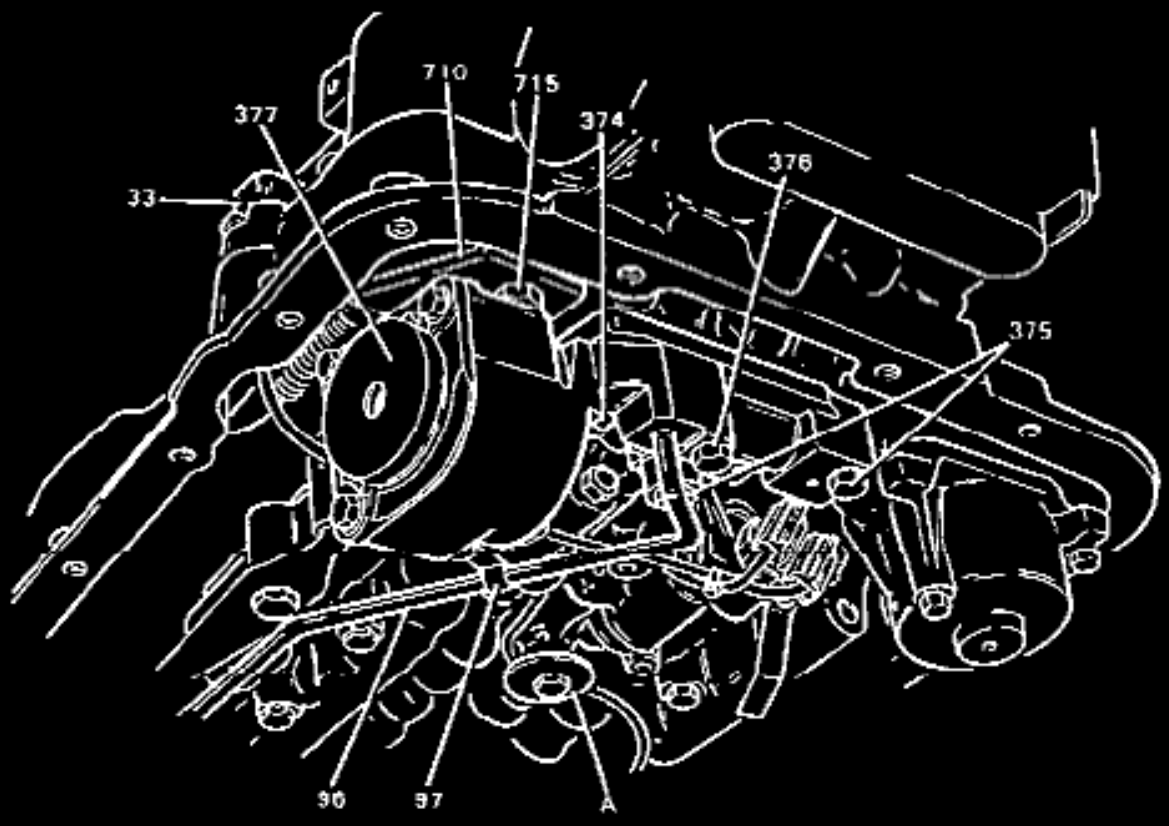
This part is currently available from GMSPO.

IMPORTANT: The plastic Front Accumulator Piston (8629080) should be replaced if found in any 1978-88 Control Valve Assembly (049).

SERVICE MANUAL REFERENCE:

Refer to the Unit Repair Section of the appropriate Service Manual for proper replacement procedure.

Figure 1



FRONT

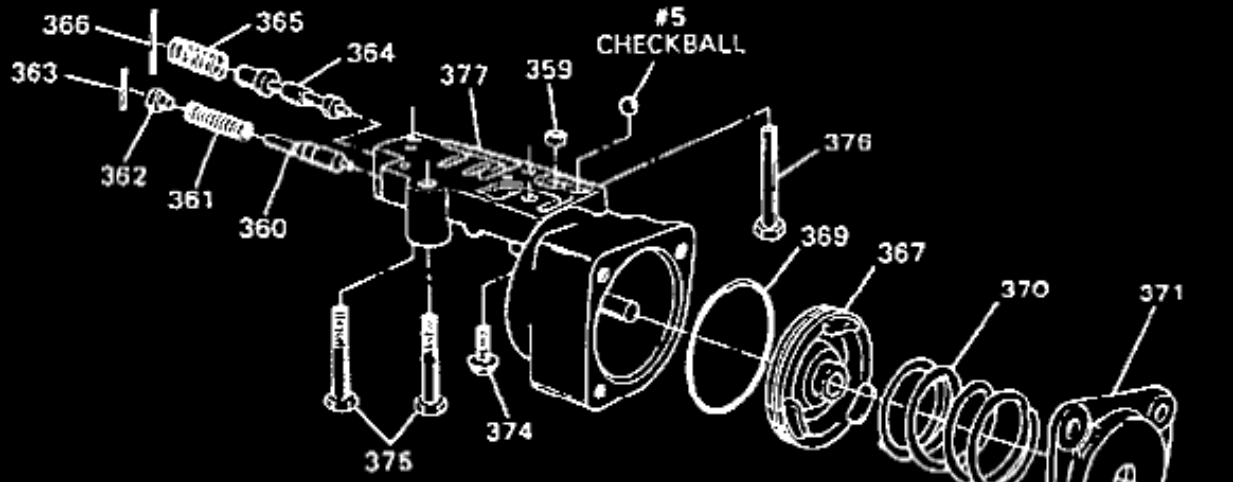
ILL. NO.	DESCRIPTION
A	WASHER, WIRE RETAINING
33	CONNECTOR, ELECTRICAL
96	TUBE, AUXILIARY ACCUMULATOR VALVE
97	CLAMP, TUBE
374	BOLT, SPECIAL HEX HEAD (M6 X 1 X 16)
375	BOLT, HEX HEAD (M6 X 1 X 35)
376	BOLT, HEX HEAD (M6 X 1 X 45)
377	AUXILIARY ACCUM. VALVE BODY ASM.
710	BRACKET, PARKING LOCK
715	BOLT, PARKING LOCK BRACKET

Accumulator: All Technical Service Bulletins A/T - 700R4 Auxiliary Accumulator Valve

SIL 87-13 (Apr)

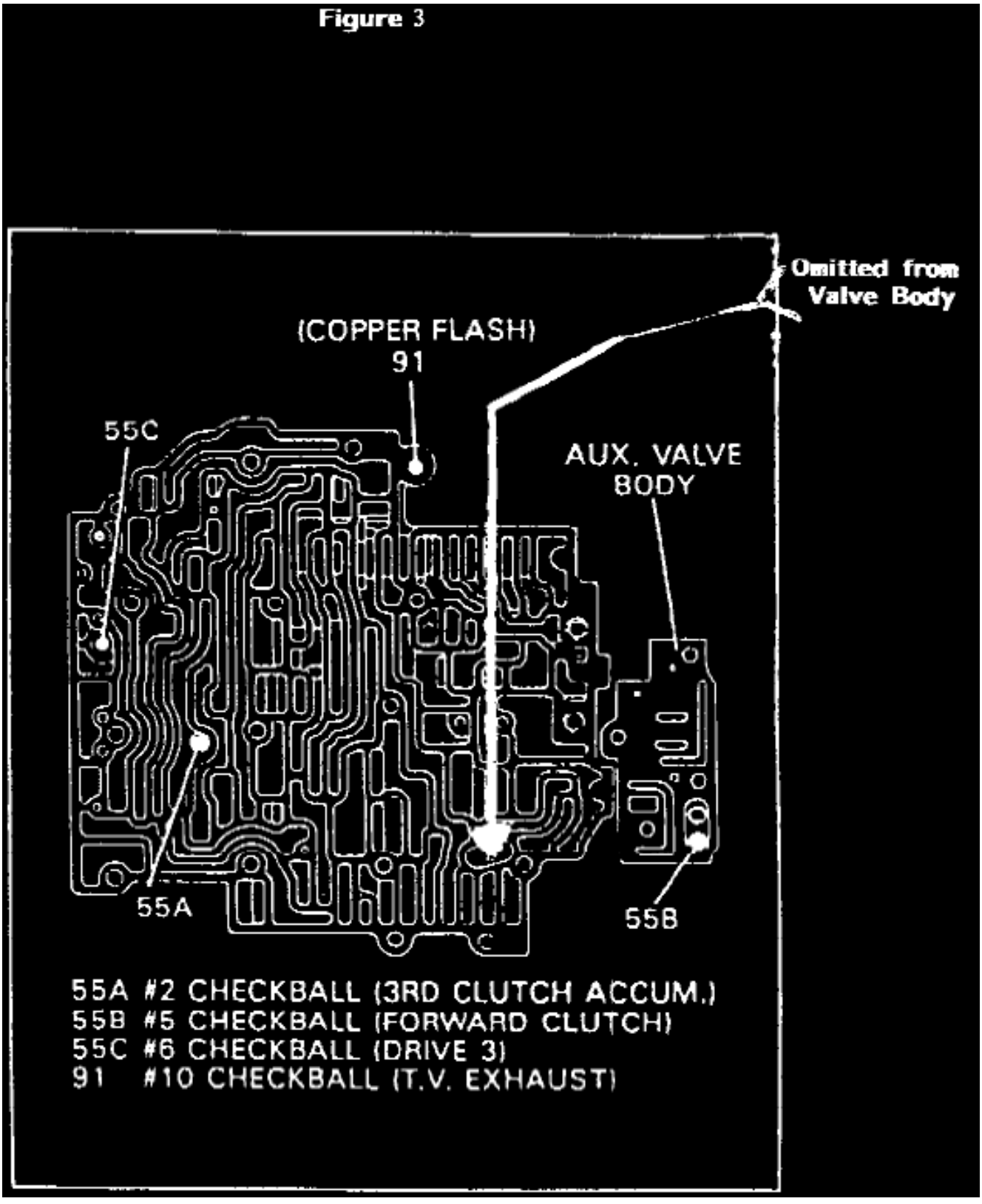
Subject: 700 R4

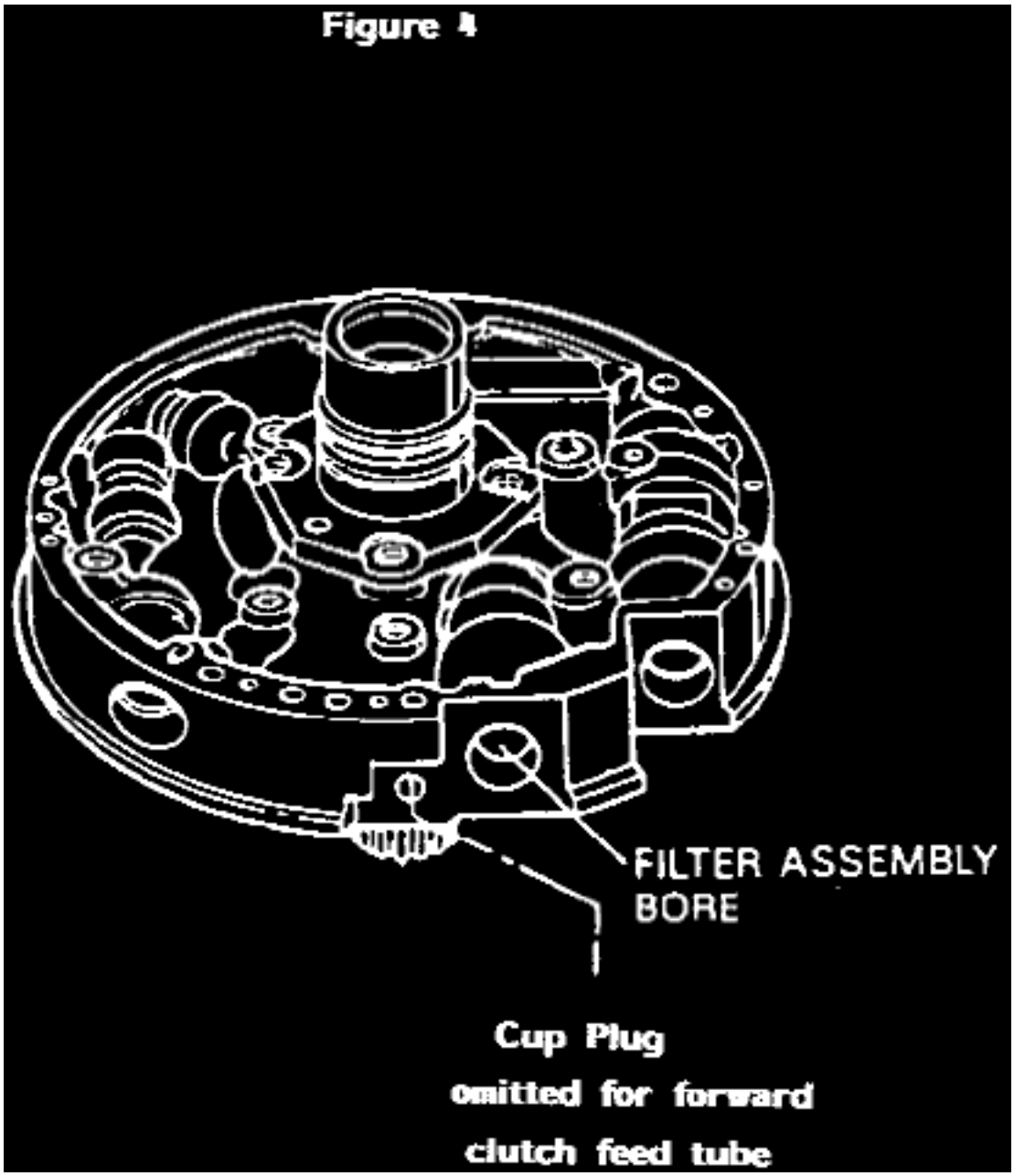
Figure 2



359 PLUG, CUP (ORIFICE)
360 VALVE, ABUSE
361 SPRING, ABUSE VALVE
362 STOP, ABUSE VALVE
363 PIN, SPRING
364 VALVE, LO OVERRUN CLUTCH
365 SPRING, LO OVERRUN CLUTCH VALVE
366 PIN, SPRING VALVE RETAINING
367 PISTON, ACCUMULATOR
369 RING, OIL SEAL ACCUMULATOR PISTON
370 SPRING, ACCUMULATOR PISTON
371 COVER, AUXILIARY ACCUMULATOR VALVE
373 BOLT, SPEC. HEX WASHER HEAD (M6 X 1 X 24)
374 BOLT, SPEC. HEX WASHER HEAD (M6 X 1 X 16)
375 BOLT, HEX HEAD (M6 X 1 X 40)
376 BOLT, HEX HEAD (M6 X 1 X 45)
377 AUXILIARY ACCUM. VALVE BODY ASM.

Figure 3


Omitted from Valve Body
(COPPER FLASH)
91
55C
AUX. VALVE BODY
55A
55B
55A #2 CHECKBALL (3RD CLUTCH ACCUM.)
55B #5 CHECKBALL (FORWARD CLUTCH)
55C #6 CHECKBALL (DRIVE 3)
91 #10 CHECKBALL (T.V. EXHAUST)



1. After October 6, 1986 (Julian date 279) all THM 700 R4's have an auxiliary accumulator valve body. It is bolted to the case adjacent to the main valve body. (See Figure 1) The auxiliary accumulator valve body is diecast aluminum and contains a forward clutch accumulator, an abuse shuttle valve, and a low overrun valve (See Figure 2) to provide smooth neutral to drive shifts, increased forward durability, and smooth manual 2-1 downshifts. The number 5 checkball is in the auxiliary accumulator valve body, instead of its usual spot in the valve body (See Figure 3). A tube feeding the forward clutch extends from the auxiliary accumulator accumulator valve body to the pump. The forward feed cup plug in the pump has been omitted so the tube can fit in. (See Figure 4)

2. Since the auxiliary valve body has been added, the valve body gaskets are as follows: 8667232 upper gasket and 8663583 for the lower gasket. The use of earlier model gaskets on the 1987 THM 700 R4 covers a 3rd clutch hole on the separator plate.

3. The separator plate is stamped with two letter codes for identification. If the first letter stamped is "A", that plate is used with the auxiliary valve body.

4. The case has a window cut out of it to make room for the tube as it goes into the pump. Many 1986 THM 700 R4 cases have this provision. A bleed orifice lube hole has been added to the governor bore. To find this, look through the back of the case where the extension housing is bolted.

5. The transmission oil pan for the 1987 THM 700 R4 is slightly deeper to accommodate the auxiliary accumulator valve body. The 1987 models use part number 8663618. The 1982-1986 models use part number 8654700.

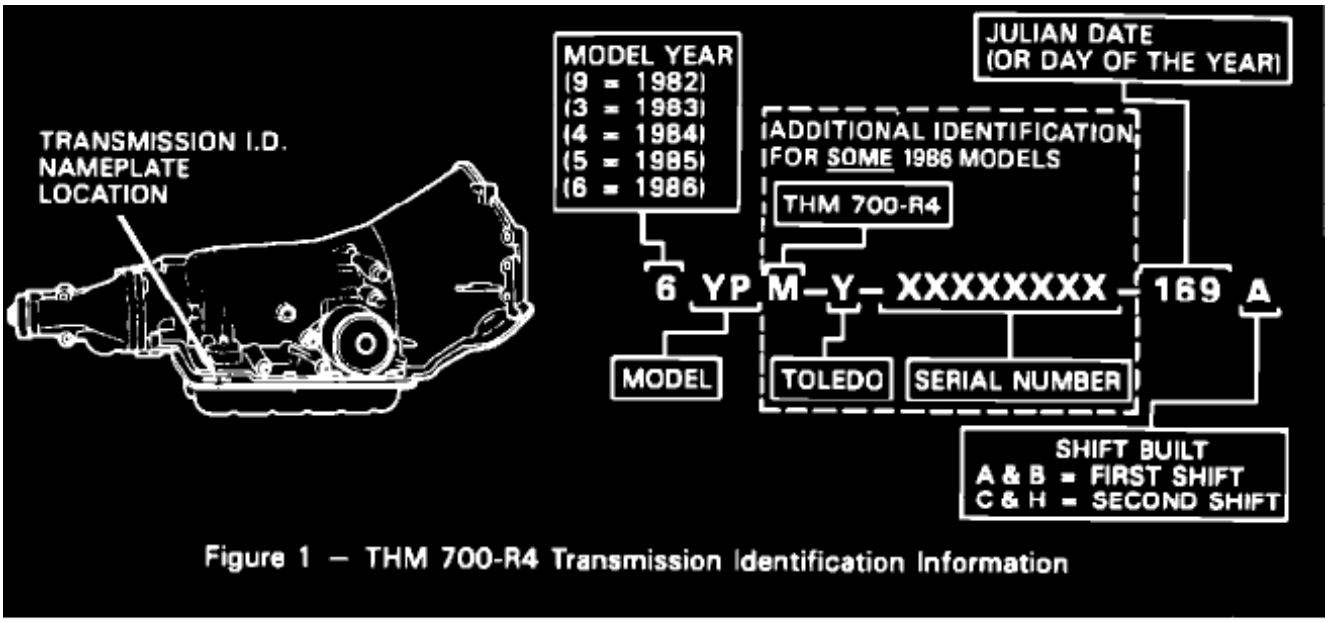


Figure 1 – THM 700-R4 Transmission Identification Information

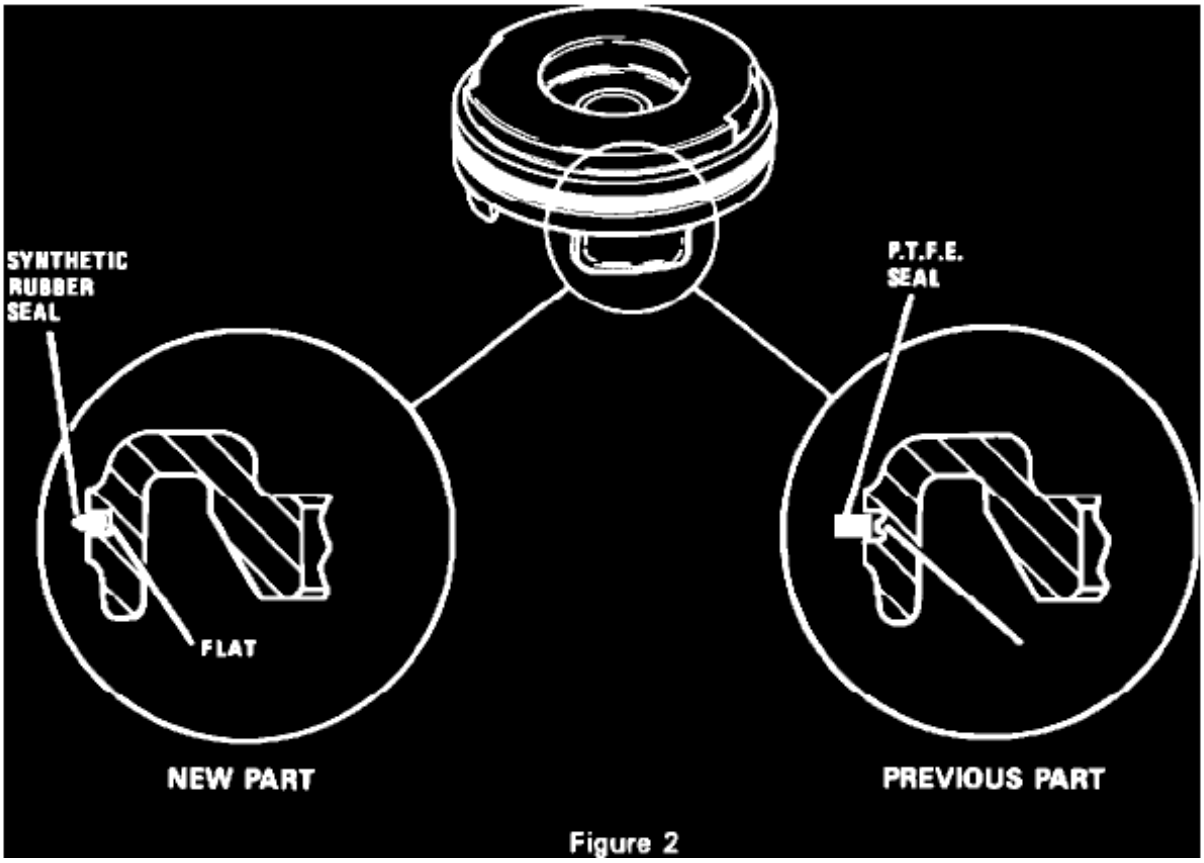


Figure 2

Accumulator: All Technical Service Bulletins A/T - Accumulator Pistons & Seals Enhance Shift Points

Number: 86-148

Section: 7A

Date: Sept. 1986

Subject: NEW ACCUMULATOR PISTONS AND SEALS FOR ENHANCED SHIFT POINTS AND SHIFT SMOOTHNESS

Model and Year: 1982-1986 ALL MODELS WITH THM 700-R4 TRANSMISSIONS

TO: ALL CHEVROLET DEALERS

FIGURE 1 - THM 700-R4 TRANSMISSION IDENTIFICATION INFORMATION

Beginning June 18, 1986, or Julian Date 169, (Refer to Figure 1) all 1986 THM 700-R4 transmissions are built using new 1-2 and 3-4 accumulator pistons and seals to assist in maintaining consistent shift points and smoothness.

FIGURE 2 - NEW PART VS PREVIOUS PART

When servicing a 1982 through 1986 THM 700-R4 transmission, use the new pistons and seals (refer to Figure 2) which are available as service package

part number 8635909 (one piston and one seal per package). The oil seal is available separately as service part number 8635568. Important:

The same design accumulator piston and seal are used in both the 1-2 and 3-4 circuits.

Refer to the appropriate Service Manual for removal and installation procedures.

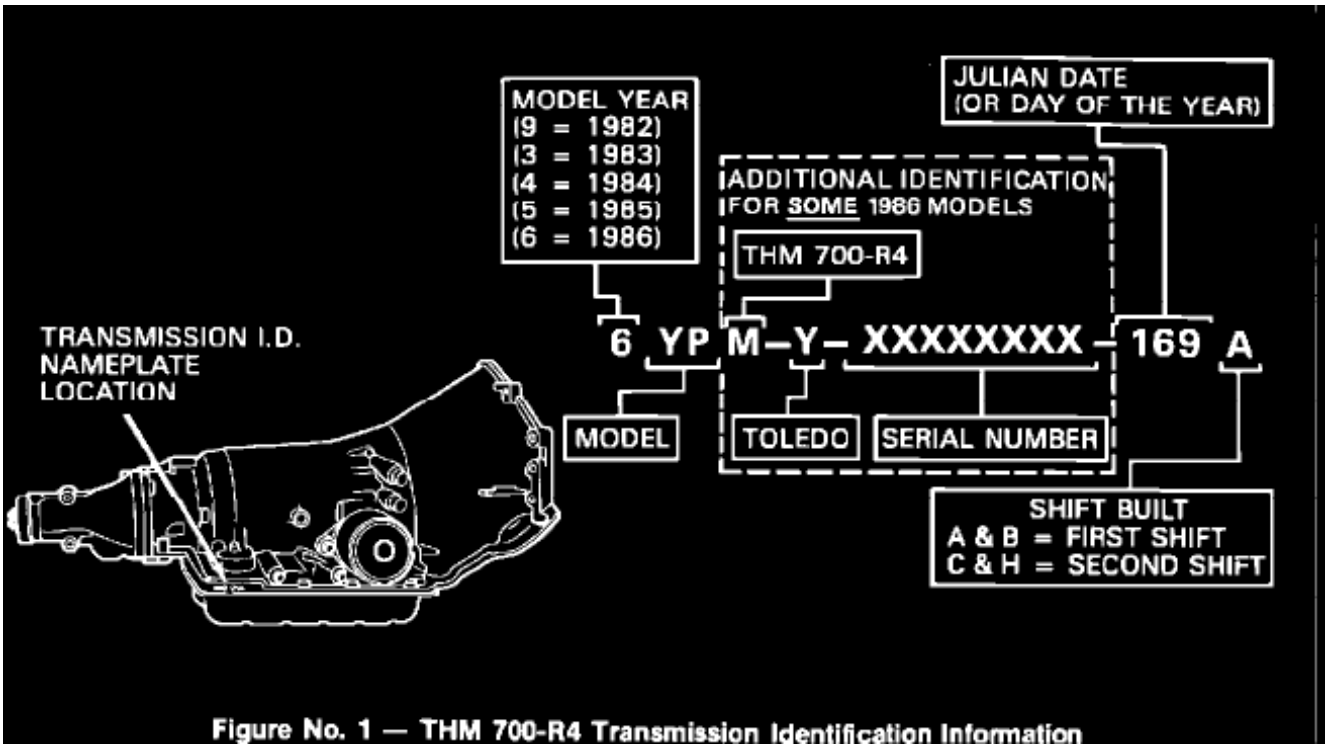


Figure No. 1 — THM 700-R4 Transmission Identification Information

Accumulator: All Technical Service Bulletins A/T - Consistent Shift Points and Smoothness

NUMBER: 86-B-116

GROUP: 7A - Automatic Transmission

DATE: August, 1986

SUBJECT: CONSISTENT SHIFT POINTS AND SMOOTHNESS NEW ACCUMULATOR PISTONS AND SEALS

MODELS: 1982-86 LIGHT DUTY MODELS WITH THM 700-R4 AUTOMATIC TRANSMISSIONS

THM 700-R4 Transmission Identification Information

Beginning June 18, 1986, or Julian date 169, (refer to Figure No. 1) all 1986 THM 700-R4 transmissions are built using new 1-2 and 3-4 accumulator pistons and seals to assist in maintaining consistent shift points and smoothness.

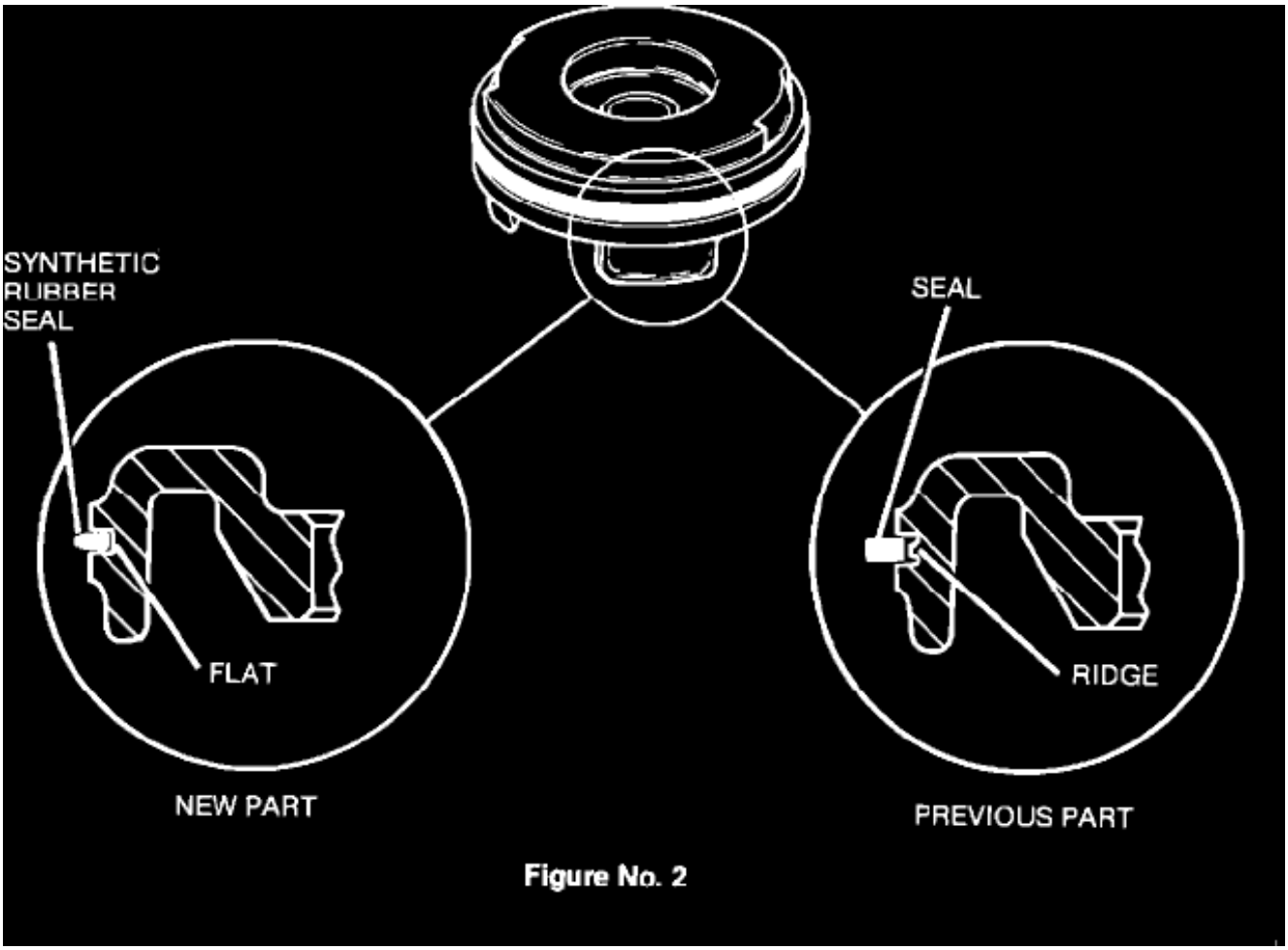


Figure No. 2

New Pistons & Seals

When servicing a 1982 through 1986 THM 700- R4 transmission, use the new pistons and seals (refer to Figure No. 2) which are available as

service package part number 8635909 (one piston and one seal per package). Also, the oil seal is available separately as service part number 8635568.

IMPORTANT: The same design accumulator piston and seal are used in both the 1-2 and 3-4 circuits. Refer to the appropriate service manual for removal and installation procedures.

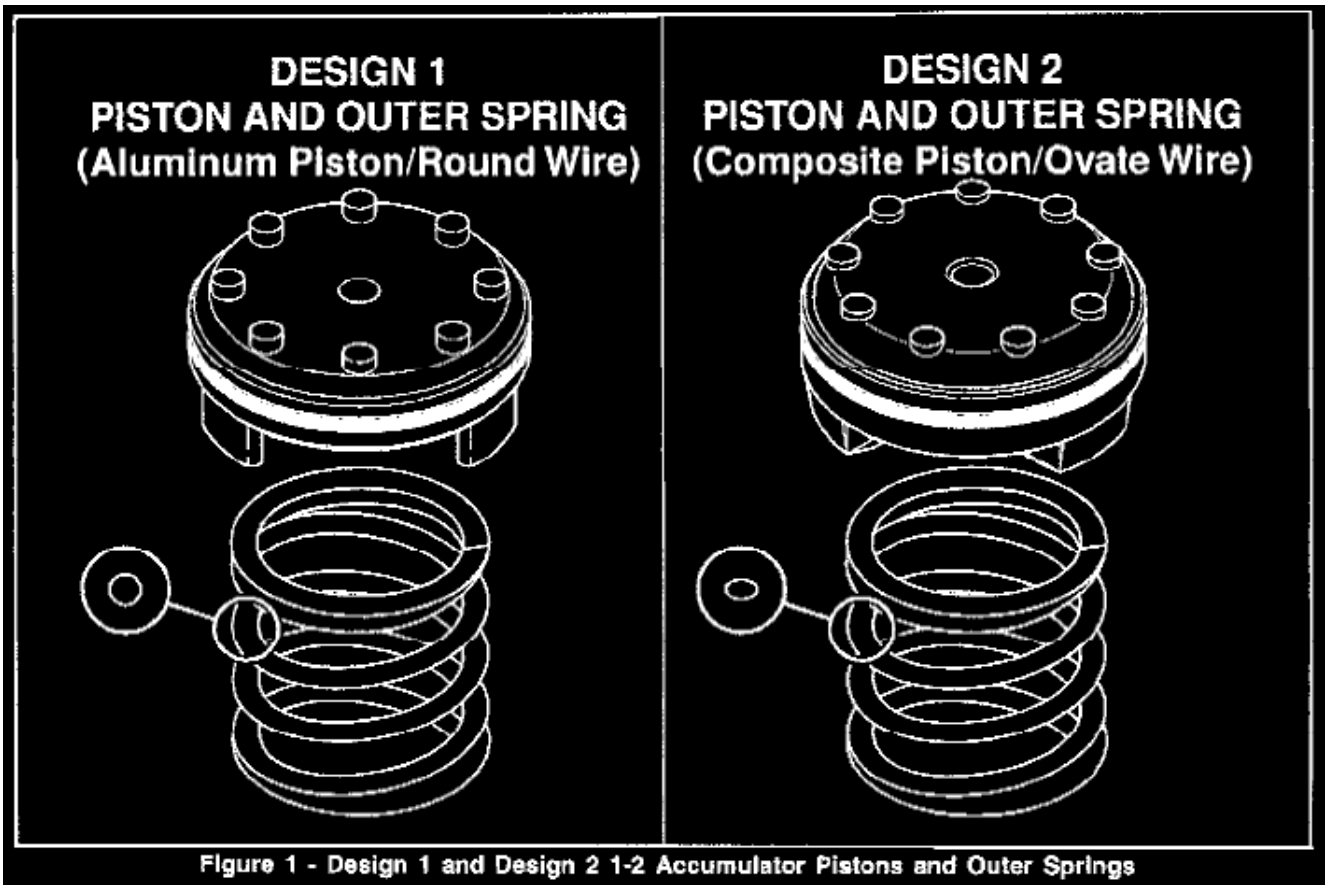


Figure 1 - Design 1 and Design 2 1-2 Accumulator Pistons and Outer Springs

Accumulator: All Technical Service Bulletins A/T - 1-2 Accumulator Piston/Outer Spring Replacement

File In Section: 7 - Transmission

Bulletin No.: 87-71-74

Date: November, 1998

INFORMATION

Subject: 1-2 Accumulator Piston and Outer Spring Replacement

Models: 1982-96 Buick Roadmaster 1982-96 Cadillac Brougham, Fleetwood, DeVille 1982-86 Chevrolet Caprice 1982-99 Chevrolet Camaro, Corvette 1982-99 Pontiac Firebird with HYDRA-MATIC 4L60, 4L60-E Transmission (RPOs MD8, M30)

1982-99 Chevrolet and GMC C/K, M/L, S/T, G Models 1991-99 Oldsmobile Bravada with HYDRA-MATIC 4L60, 4L60-E Transmission (RPOs MD8, M30)

Transmissions built from 1982 through 1999 were built with one of two styles of 1-2 accumulator pistons and outer springs.

Important:

The 1-2 accumulator pistons and outer springs are not interchangeable.

For replacement of the 1-2 accumulator piston and outer spring, remove the 1-2 accumulator assembly and inspect the interior for the presence of either an aluminum or composite (plastic) 1-2 accumulator piston.

Design 1

1-2 accumulator assemblies with an aluminum piston and a round wire outer spring, use service package P/N 24204495 (1982-1993) or P/N 24204496

(1994-1997).

Design 2

1-2 accumulator assemblies with a composite (plastic) piston and an ovate wire outer spring, started May 11, 1998 (Julian Date 131), use service package P/N 24214343 (1998-1999).

Notice:

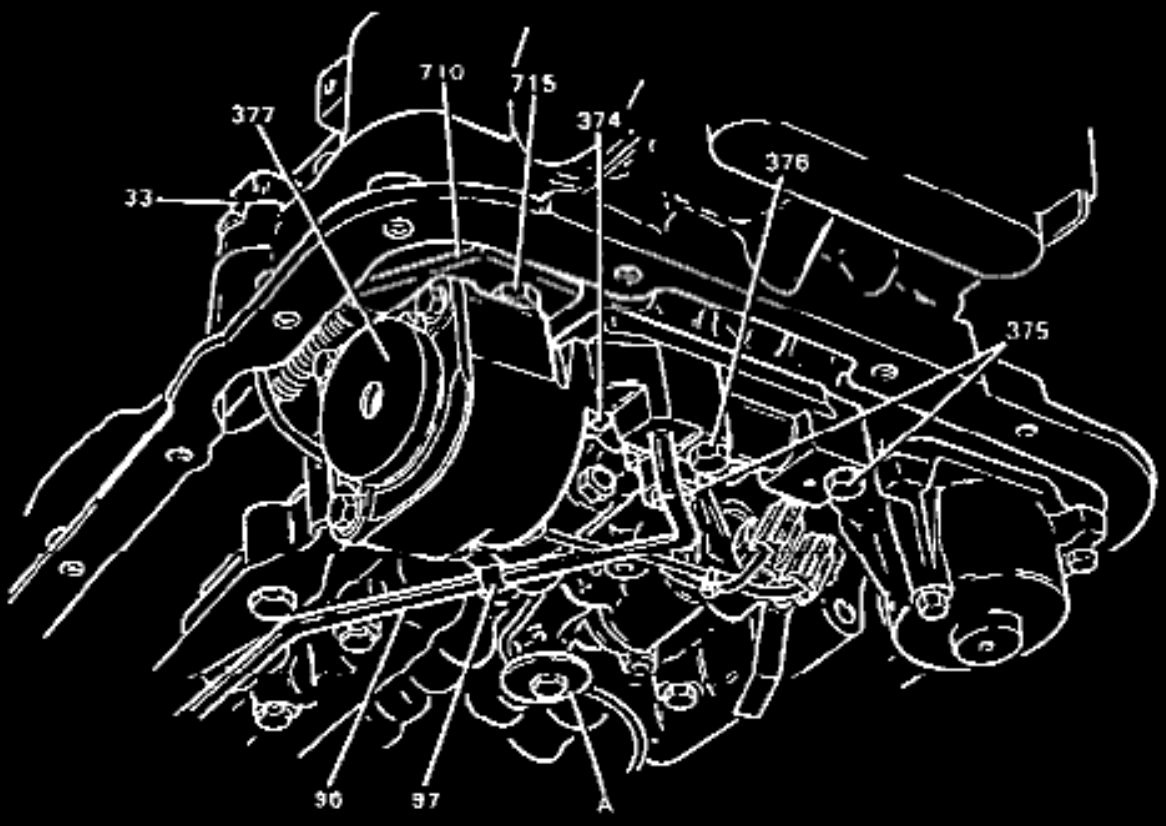
Failure to follow the above instructions may result in transmission distress.

Parts Information

Parts are currently available from GMSPO.

Chevrolet G 20 Van Workshop Manual (V8-350 5.7L (1985))
Chevrolet Workshop Manuals > Transmission and Drivetrain > Automatic Transmission/Transaxle > Accumulator, A/T > Component Information > Technical Service Bulletins > All Other Service Bulletins for Accumulator: > ATRASIL8713 > Apr > 87 > A/T - 700R4 Auxiliary Accumulator Valve

Figure 1



FRONT

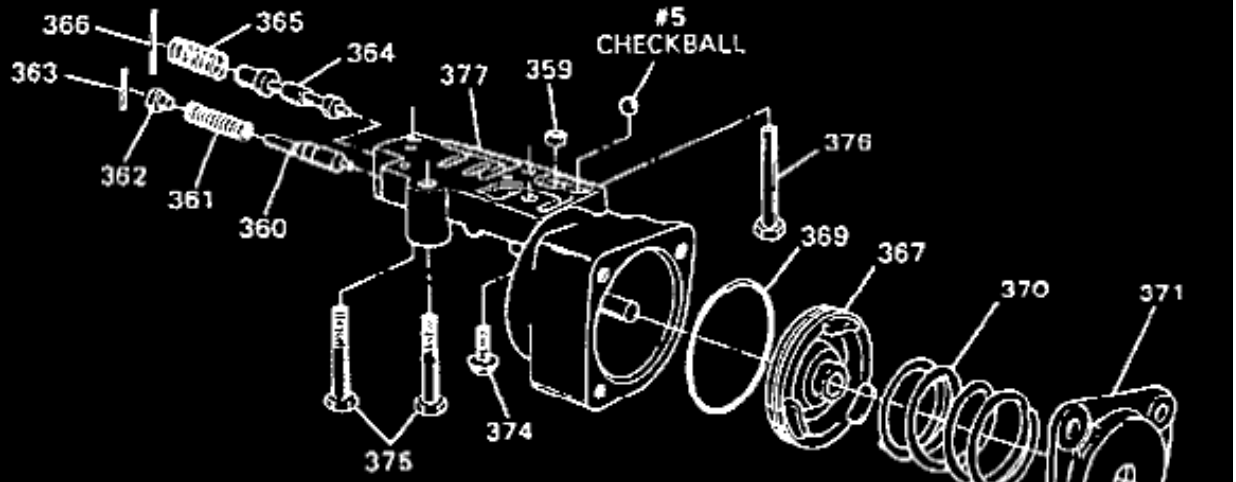
ILL. NO.	DESCRIPTION
A	WASHER, WIRE RETAINING
33	CONNECTOR, ELECTRICAL
96	TUBE, AUXILIARY ACCUMULATOR VALVE
97	CLAMP, TUBE
374	BOLT, SPECIAL HEX HEAD (M6 X 1 X 16)
375	BOLT, HEX HEAD (M6 X 1 X 35)
376	BOLT, HEX HEAD (M6 X 1 X 45)
377	AUXILIARY ACCUM. VALVE BODY ASM.
710	BRACKET, PARKING LOCK
715	BOLT, PARKING LOCK BRACKET

Accumulator: All Technical Service Bulletins A/T - 700R4 Auxiliary Accumulator Valve

SIL 87-13 (Apr)

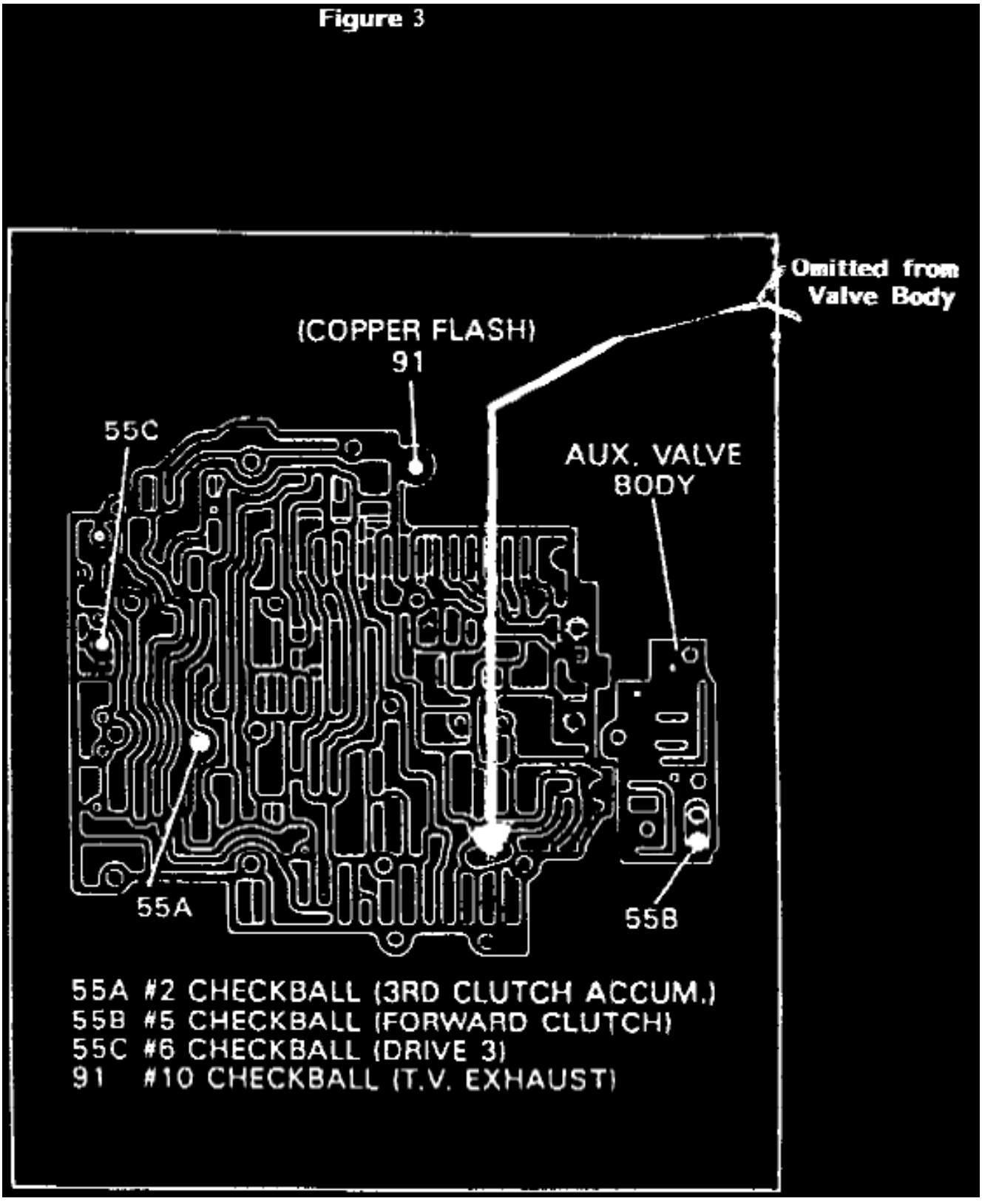
Subject: 700 R4

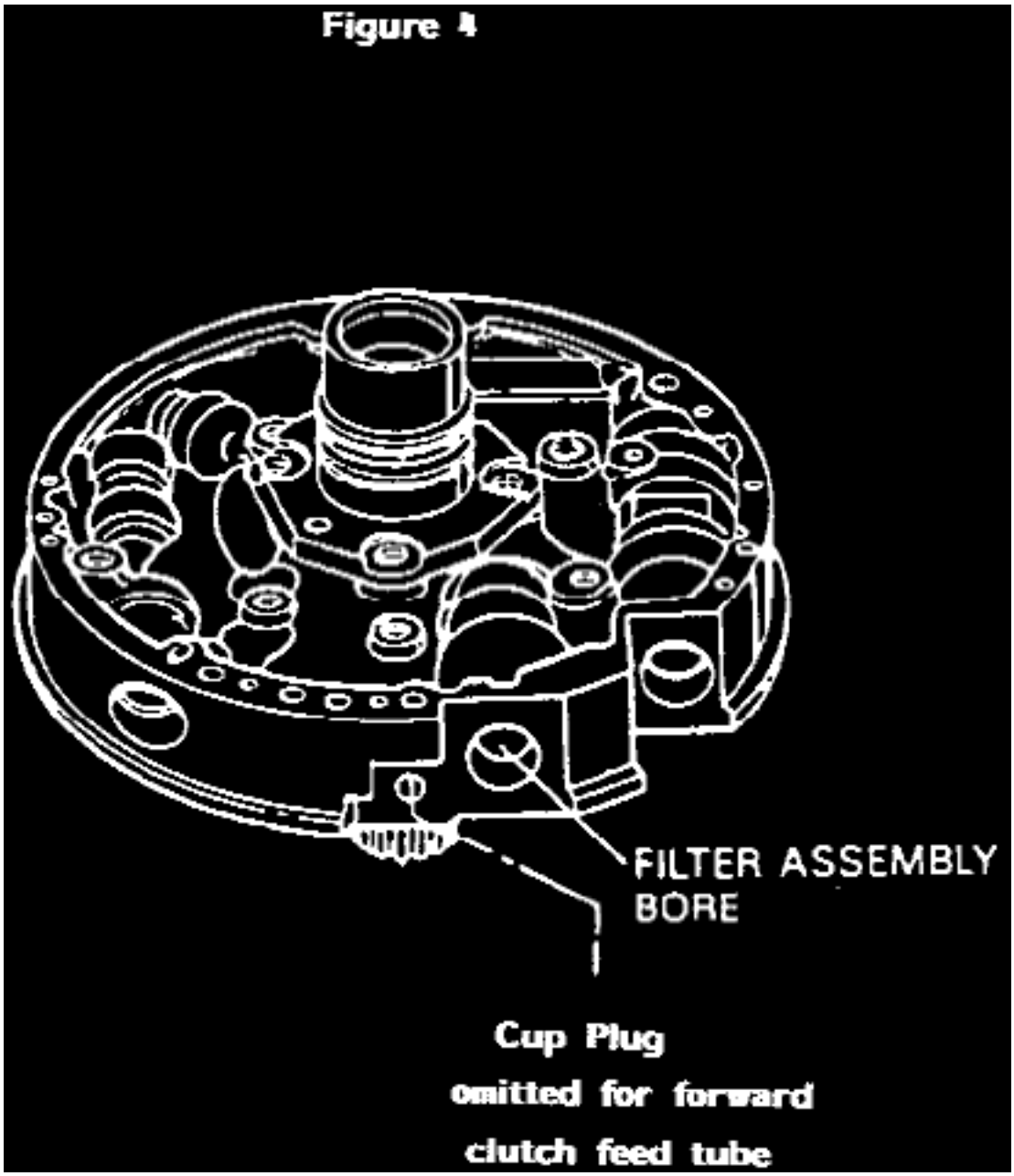
Figure 2



359 PLUG, CUP (ORIFICE)
360 VALVE, ABUSE
361 SPRING, ABUSE VALVE
362 STOP, ABUSE VALVE
363 PIN, SPRING
364 VALVE, LO OVERRUN CLUTCH
365 SPRING, LO OVERRUN CLUTCH VALVE
366 PIN, SPRING VALVE RETAINING
367 PISTON, ACCUMULATOR
369 RING, OIL SEAL ACCUMULATOR PISTON
370 SPRING, ACCUMULATOR PISTON
371 COVER, AUXILIARY ACCUMULATOR VALVE
373 BOLT, SPEC. HEX WASHER HEAD (M6 X 1 X 24)
374 BOLT, SPEC. HEX WASHER HEAD (M6 X 1 X 16)
375 BOLT, HEX HEAD (M6 X 1 X 40)
376 BOLT, HEX HEAD (M6 X 1 X 45)
377 AUXILIARY ACCUM. VALVE BODY ASM.

Figure 3


Omitted from Valve Body
(COPPER FLASH)
91
55C
AUX. VALVE BODY
55A
55B
55A #2 CHECKBALL (3RD CLUTCH ACCUM.)
55B #5 CHECKBALL (FORWARD CLUTCH)
55C #6 CHECKBALL (DRIVE 3)
91 #10 CHECKBALL (T.V. EXHAUST)



1. After October 6, 1986 (Julian date 279) all THM 700 R4's have an auxiliary accumulator valve body. It is bolted to the case adjacent to the main valve body. (See Figure 1) The auxiliary accumulator valve body is diecast aluminum and contains a forward clutch accumulator, an abuse shuttle valve, and a low overrun valve (See Figure 2) to provide smooth neutral to drive shifts, increased forward durability, and smooth manual 2-1 downshifts. The number 5 checkball is in the auxiliary accumulator valve body, instead of its usual spot in the valve body (See Figure 3). A tube feeding the forward clutch extends from the auxiliary accumulator accumulator valve body to the pump. The forward feed cup plug in the pump has been omitted so the tube can fit in. (See Figure 4)

2. Since the auxiliary valve body has been added, the valve body gaskets are as follows: 8667232 upper gasket and 8663583 for the lower gasket. The use of earlier model gaskets on the 1987 THM 700 R4 covers a 3rd clutch hole on the separator plate.

3. The separator plate is stamped with two letter codes for identification. If the first letter stamped is "A", that plate is used with the auxiliary valve body.

4. The case has a window cut out of it to make room for the tube as it goes into the pump. Many 1986 THM 700 R4 cases have this provision. A bleed orifice lube hole has been added to the governor bore. To find this, look through the back of the case where the extension housing is bolted.

5. The transmission oil pan for the 1987 THM 700 R4 is slightly deeper to accommodate the auxiliary accumulator valve body. The 1987 models use part number 8663618. The 1982-1986 models use part number 8654700.

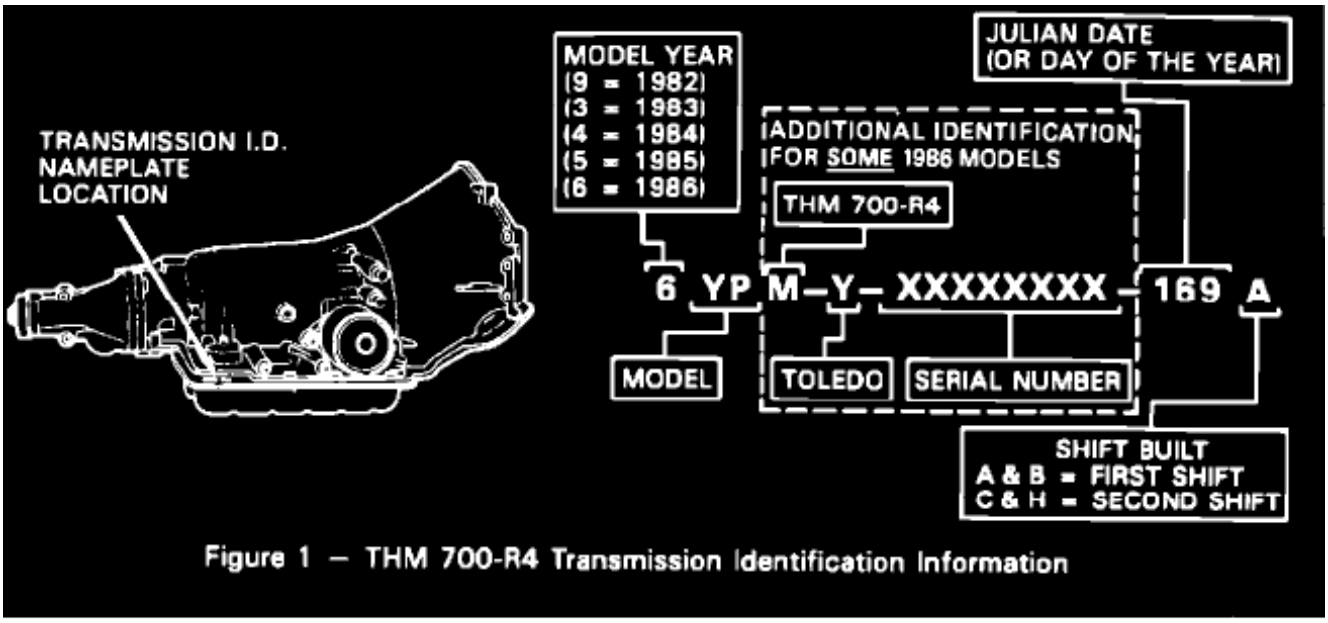


Figure 1 – THM 700-R4 Transmission Identification Information

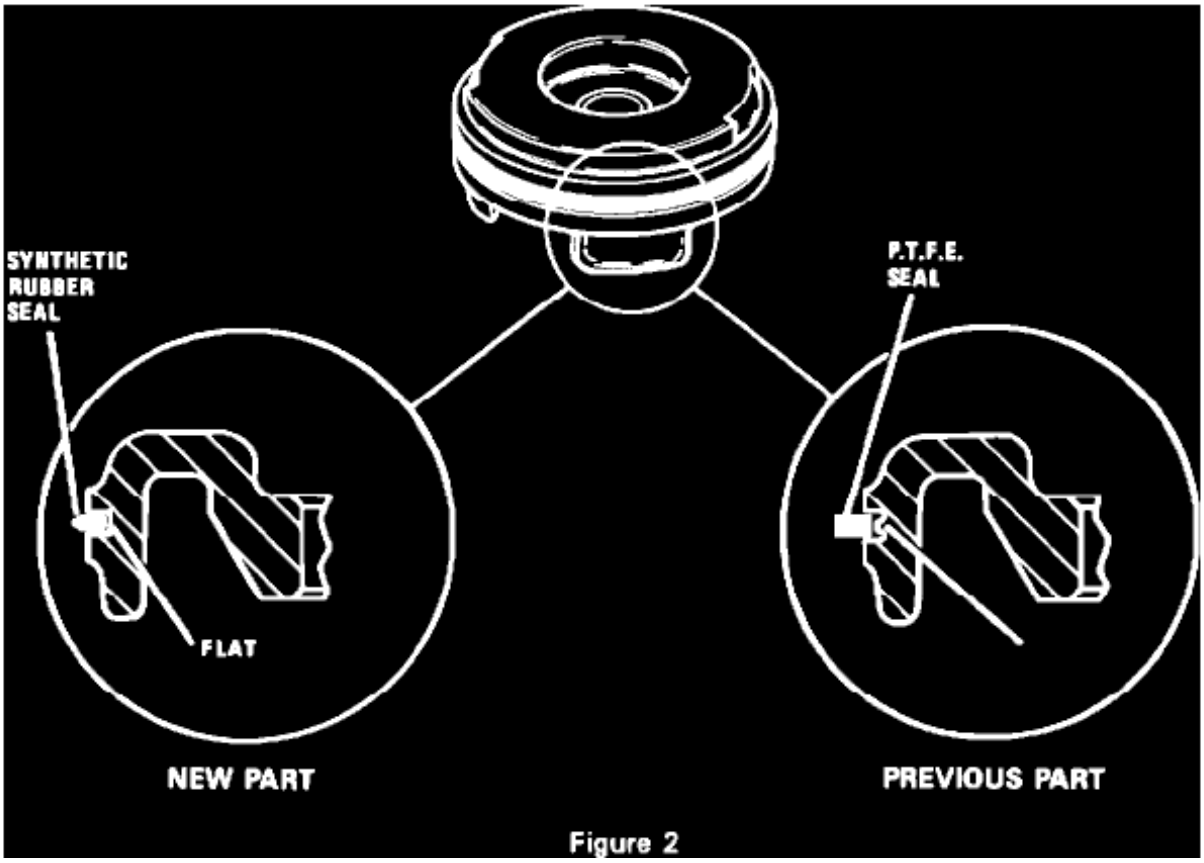


Figure 2

Accumulator: All Technical Service Bulletins A/T - Accumulator Pistons & Seals Enhance Shift Points

Number: 86-148

Section: 7A

Date: Sept. 1986

Subject: NEW ACCUMULATOR PISTONS AND SEALS FOR ENHANCED SHIFT POINTS AND SHIFT SMOOTHNESS

Model and Year: 1982-1986 ALL MODELS WITH THM 700-R4 TRANSMISSIONS

TO: ALL CHEVROLET DEALERS

FIGURE 1 - THM 700-R4 TRANSMISSION IDENTIFICATION INFORMATION

Beginning June 18, 1986, or Julian Date 169, (Refer to Figure 1) all 1986 THM 700-R4 transmissions are built using new 1-2 and 3-4 accumulator pistons and seals to assist in maintaining consistent shift points and smoothness.

FIGURE 2 - NEW PART VS PREVIOUS PART

When servicing a 1982 through 1986 THM 700-R4 transmission, use the new pistons and seals (refer to Figure 2) which are available as service package